206
C55.422:7/18
COMPLETED
554
(serial)

United States Coast Pilot 7

Pacific Coast: California, Oregon, Washington, and Hawaii

Eighteenth Edition
June 1982

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey

United States Coast Pilot

7

Pacific Coast: California, Oregon, Washington, and Hawaii

Eighteenth Edition
June 1982

Corrected through:
Local Notices to Mariners issued by Coast Guard District Commanders, February 23, 1982.

Weekly Notice to Mariners published by Defense Mapping Agency Hydrographic/Topographic Center, No. 14, April 3,1982.

Next edition about June 1983

U.S. DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration
John V. Byrne, Administrator

National Ocean Survey
H. R. Lippold, Jr., Director

Washington, D.C.: 1982
For sale by the National Ocean Survey and its sales agents.

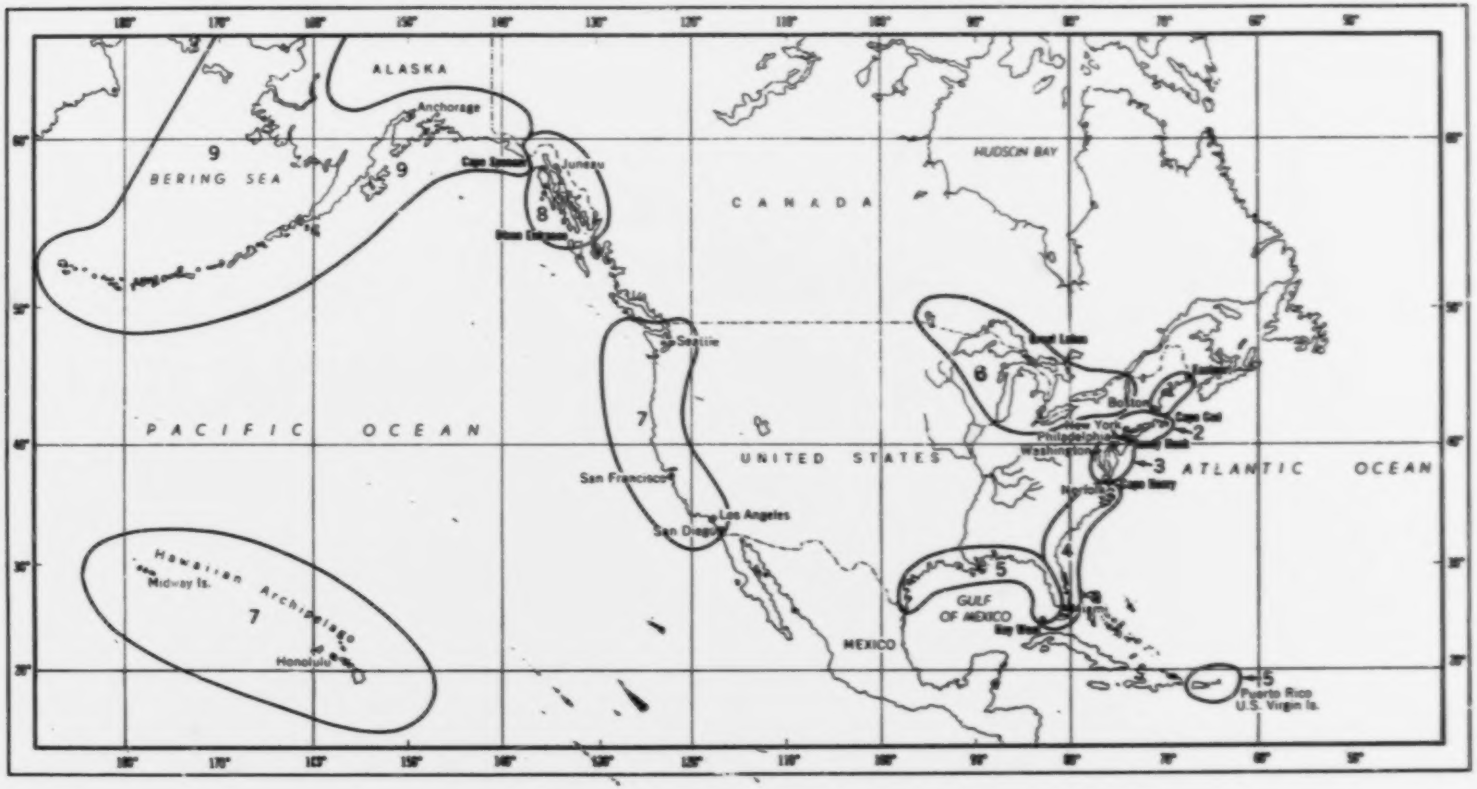
BEST DOCUMENT AVAILABLE

LIMITS OF UNITED STATES COAST PILOTS

Atlantic Coast
- 1 Eastport to Cape Cod
- 2 Cape Cod to Sandy Hook
- 3 Sandy Hook to Cape Henry
- 4 Cape Henry to Key West
- 5 Gulf of Mexico, Puerto Rico, and Virgin Islands

Pacific Coast
- 7 California, Oregon, Washington, and Hawaii
- 8 Alaska - - Dixon Entrance to Cape Spencer
- 9 Alaska - - Cape Spencer to Beaufort Sea

Great Lakes
- 6 The Lakes and their Connecting Waterways


ALASKA
Anchorage
Cape Spencer
Juneau
Dixon Entrance
9
BERING SEA
9
8
CANADA
HUDSON BAY
PACIFIC OCEAN
Seattle
7
San Francisco
Los Angeles
San Diego
UNITED STATES
Great Lakes
6
Eastport
1
Boston
Cape Cod
2
New York
Philadelphia
Washington
Sandy Hook
3
Norfolk
Cape Henry
ATLANTIC OCEAN
4
5
GULF OF MEXICO
Key West
MEXICO
5
Puerto Rico
U.S. Virgin Is.
Hawaiian Archipelago
Midway Is.
7
Honolulu

Preface

United States Coast Pilots are published by the National Ocean Survey pursuant to the Act of 6 August 1947 (33 U.S.C. 883a and b), and the Act of 2 July 1958 (PL 85-480; 72 Stat. 279).

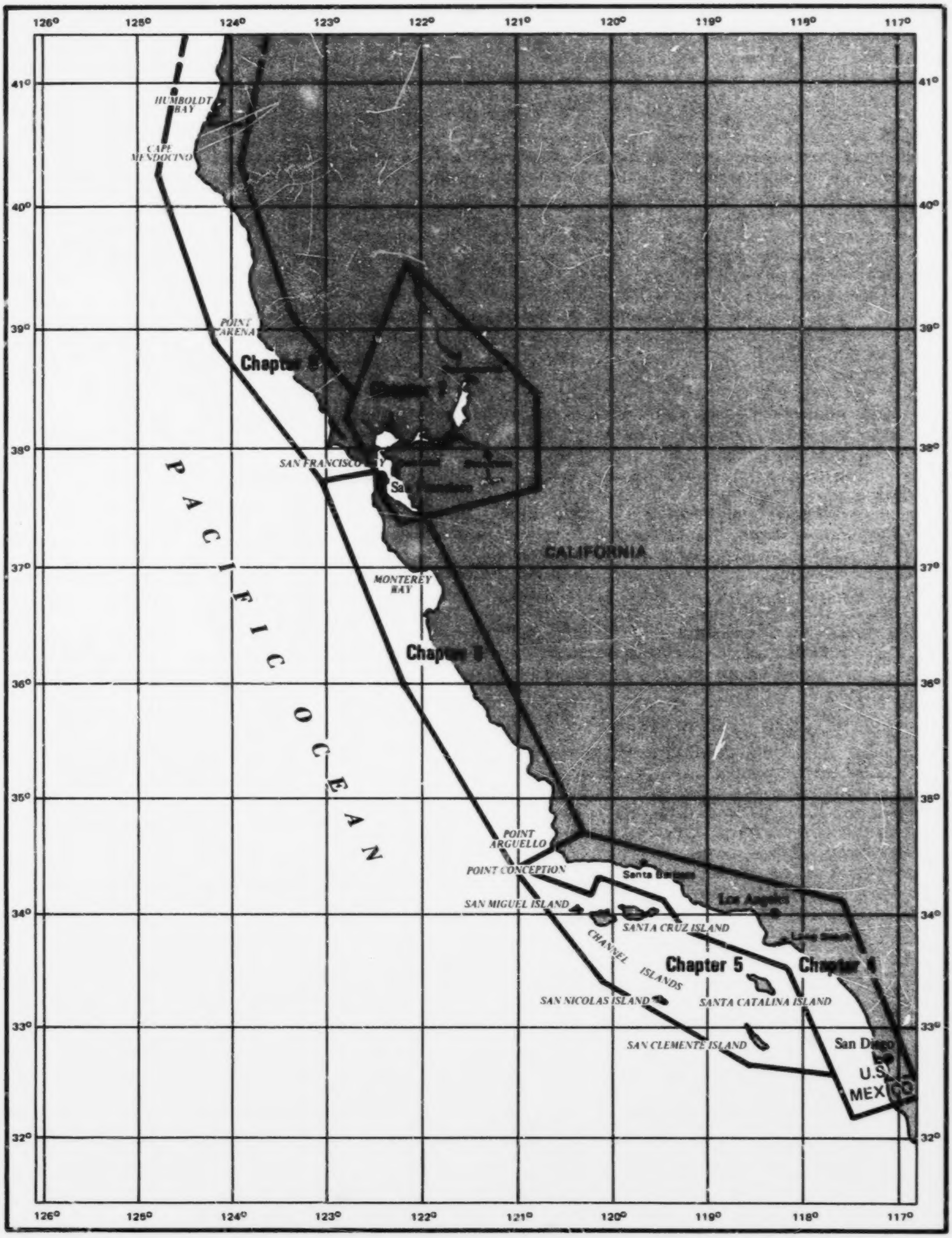
Coast Pilots supplement the navigational information shown on the nautical charts and are based upon field inspections conducted by the National Ocean Survey, information published in Notices to Mariners, and the reports from NOAA survey vessels, other Government agencies, State and local governments, maritime and pilotage associations, port authorities, mariners, and others. The tables which follow the appendix are usually revised about every 5 years.

This volume of Coast Pilot 7, Pacific Coast, California, Oregon, Washington, and Hawaii, cancels the Seventeenth (June 1981) Edition.

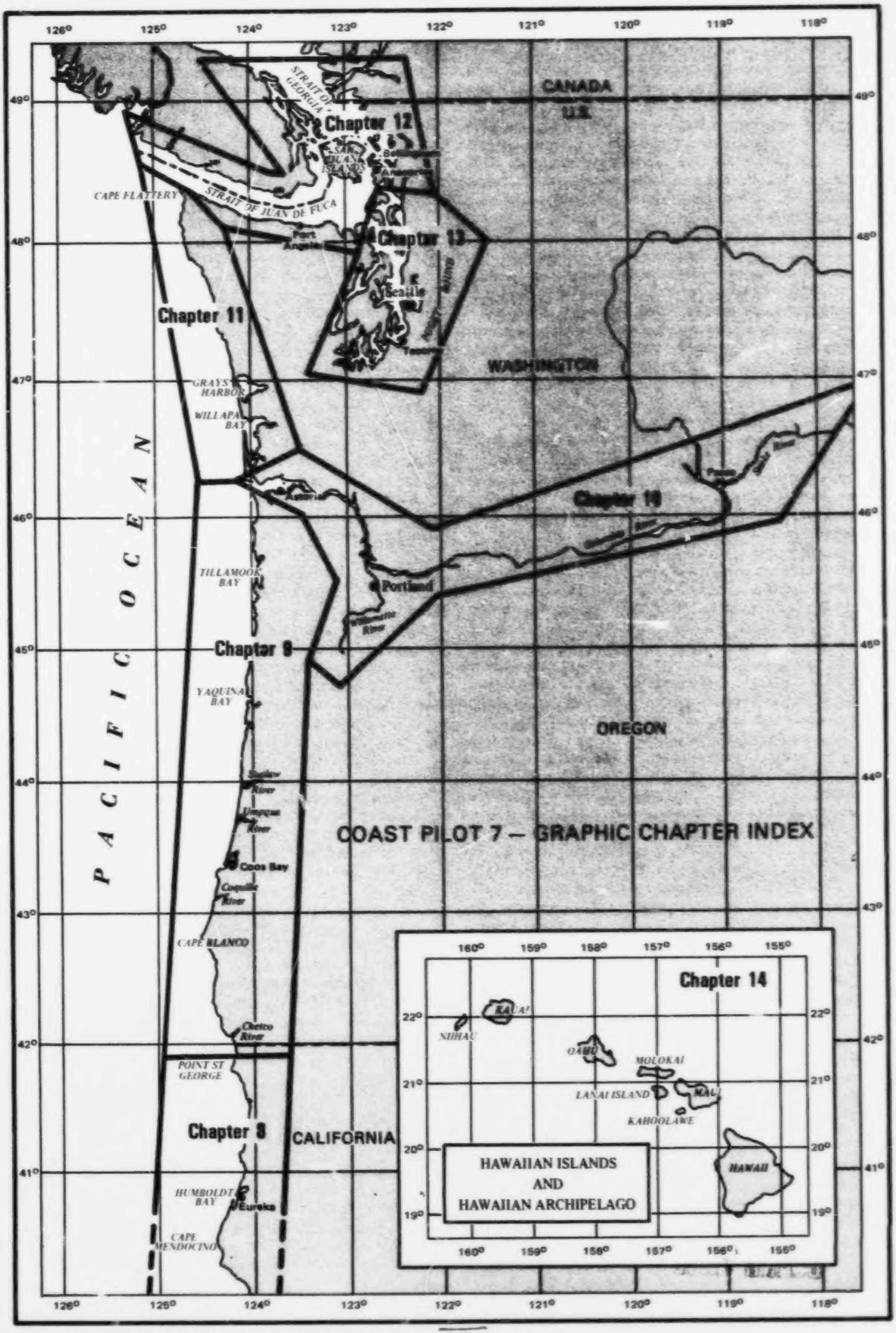
Caution: The Coast Pilot is corrected through the dates of Notices to Mariners shown on the title page and should not be used without reference to the Notices to Mariners issued subsequent to those dates.

Mariners and others are urged to report promptly to the National Ocean Survey errors, omissions, or any conditions found to differ from or to be additional to those published in the Coast Pilot or shown on the charts in order that they may be fully investigated and proper corrections made. A Coast Pilot Report form is included in the back of this book and a Marine Information Report form is published in the Weekly Notice to Mariners for your convenience. These reports and/or suggestions for increasing the usefulness of the Coast Pilot should be sent to Director, National Ocean Survey, Attention OA/C324, Rockville, Md. 20852.

The information published in this book has been computerized and printed by an automatic photocomposition process.


HUMBOLDT BAY
CAPE MENDOCINO
POINT ARENA
Chapter
Chapter
SAN FRANCISCO BAY
San
PACIFIC OCEAN
CALIFORNIA
MONTEREY BAY
Chapter
POINT ARGUELLO
POINT CONCEPTION
Santa Barbara
Los Angeles
Long Beach
SAN MIGUEL ISLAND
SANTA CRUZ ISLAND
CHANNEL ISLANDS
Chapter 5
Chapter
SAN NICOLAS ISLAND
SANTA CATALINA ISLAND
SAN CLEMENTE ISLAND
San Diego
U.S.
MEXICO
126°
125°
124°
123°
122°
121°
120°
119°
118°
117°
41°
40°
39°
38°
37°
36°
35°
34°
33°
32°

COAST PILOT 7 — GRAPHIC CHAPTER INDEX


126° 125° 124° 123° 122° 121° 120° 119° 118°
49° 48° 47° 46° 45° 44° 43° 42° 41°
CANADA
U.S.
STRAIT OF GEORGIA
Chapter 12
SAN JUAN ISLANDS
Bellingham
Anacortes
CAPE FLATTERY
STRAIT OF JUAN DE FUCA
Port Angeles
Chapter 13
Seattle
PUGET SOUND
Tacoma
Chapter 11
WASHINGTON
GRAYS HARBOR
WILLAPA BAY
Astoria
Pasco
Snake River
Chapter 10
Columbia River
Portland
Willamette River
TILLAMOOK BAY
PACIFIC OCEAN
Chapter 9
YAQUINA BAY
OREGON
Siuslaw River
Umpqua River
Coos Bay
Coquille River
CAPE BLANCO
Chetco River
POINT ST GEORGE
Chapter 8
CALIFORNIA
HUMBOLDT BAY
Eureka
CAPE MENDOCINO
Chapter 14
160° 159° 158° 157° 156° 155°
22° 21° 20° 19°
KAUAI
NIIHAU
OAHU
MOLOKAI
LANAI ISLAND
MAUI
KAHOOLAWE
HAWAII
HAWAIIAN ISLANDS AND HAWAIIAN ARCHIPELAGO

COAST PILOT 7 — GRAPHIC CHAPTER INDEX

BLANK PAGE

Contents

		Page
Preface		III
Chapter	1. General Information	1
Chapter	2. Navigation Regulations	26
Chapter	3. California, Oregon, and Washington	114
Chapter	4. San Diego to Point Arguello, California	124
Chapter	5. Channel Islands, California	153
Chapter	6. Point Arguello to San Francisco Bay, California	162
Chapter	7. San Francisco Bay, California	174
Chapter	8. San Francisco Bay to Point St. George, California	220
Chapter	9. Chetco River to Columbia River, Oregon	235
Chapter	10. Columbia River, Oregon to Washington	253
Chapter	11. Columbia River to Strait of Juan de Fuca, Washington	275
Chapter	12. Straits of Juan de Fuca and Georgia, Washington	287
Chapter	13. Puget Sound, Washington	322
Chapter	14. Hawaii	371
Appendix		432
Tables		(Follow Appendix)
Climatological		T-1
Meteorological		T-13
Mean Surface Water Temperatures and Densities		T-18
Determination of Wind Speed by Sea Condition		T-19
National Weather Service Coastal Warning Displays		T-20
Distance Tables		T-21
Radio Bearing Conversion Table		T-27
Distance of Visibility of Objects at Sea		T-28
Conversion, Degrees to Points and Vice Versa		T-28
Conversion, Nautical to Statute Miles and Feet to Meters		T-29
Estimating Time of Transit		T-30
Index		(Follows Tables)
Coast Pilot Report Form		(Follows Index)

1. GENERAL INFORMATION

UNITED STATES COAST PILOTS.–The National Ocean Survey Coast Pilots are a series of nine nautical books that cover a wide variety of information important to navigators of U.S. coastal and intracoastal waters, and the waters of the Great Lakes. Most of this book information cannot be shown graphically on the standard nautical charts and is not readily available elsewhere. Coast Pilot subjects include navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities.

Caution.–The Coast Pilot is corrected through the dates of Notices to Mariners shown on the title page and should not be used without reference to the Notices to Mariners issued subsequent to those dates. Changes to the Coast Pilot that affect the safety of navigation and are reported to NOS in the interim period between new editions are published in the Local and Weekly Notices to Mariners.

Bearings.–These are true and are expressed in degrees from 000° (north) to 359°, measured clockwise. General bearings are expressed by initial letters of the points of the compass (e.g., N, NNE, NE, etc.). Adjective and adverb endings, except in chapter 2, Navigation Regulations, have been discarded. Wherever precise bearings are intended degrees are used. Light-sector bearings are toward the light.

Bridges and cables.–Vertical clearances of bridges and overhead cables are in feet above mean high water unless otherwise stated; clearances of drawbridges are for the closed position, although the open clearances are also given for vertical-lift bridges. Clearances given in the Coast Pilots are those approved for nautical charting, and are supplied by the U.S. Coast Guard (bridges) and U.S. Army Corps of Engineers (cables); they may be as-built (verified by actual inspection after completion of structures) or authorized (design values specified in permit issued prior to construction). No differentiation is made in the Coast Pilots between as-built and authorized clearances. (See charts for horizontal clearances of bridges, as these are given in the Coast Pilots only when they are less than 50 feet.) Submarine cables are rarely mentioned.

Cable ferries.–Cable ferries are guided by cables fastened to shore and sometimes propelled by a cable rig attached to the shore. Generally, the cables are suspended during crossings and dropped to the bottom when the ferries dock. Where specific operating procedures are known they are mentioned in the text. Since operating procedures vary, mariners are advised to exercise extreme caution and seek local knowledge. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Courses.–These are true and are expressed in the same manner as bearings. The directives "steer" or "make good" a course mean, without exception, to proceed from a point of origin along a track having the identical meridional angle as the designated course. Vessels following the directives must allow for every influence tending to cause deviation from such track, and navigate so that the designated course is continuously being made good.

Currents.–Stated current velocities are the averages at strength. Velocities are in knots, which are nautical miles per hour. Directions are the true directions to which the currents set.

Depths.–Depths are in feet or fathoms, below **Chart Datum** of the chart unless otherwise stated. (See Chart Datum this chapter for further detail.) The **controlling depth** of a channel is the least depth within the limits of the channel; it restricts the safe use of the channel to drafts of less than that depth. The **centerline controlling depth** of a channel applies only to the channel centerline; lesser depths may exist in the remainder of the channel. The **midchannel controlling depth** of a channel is the controlling depth of only the middle half of the channel. **Federal project depth** is the design dredging depth of a channel constructed by the Corps of Engineers, U.S. Army; the project depth may or may not be the goal of maintenance dredging after completion of the channel, and, for this reason, project depth must not be confused with controlling depth. **Depths alongside wharves** usually have been reported by owners and/or operators of the waterfront facilities, and have not been verified by Government surveys; since these depths may be subject to change, local authorities should be consulted for the latest controlling depths.

In general, the Coast Pilots give the project depths for deep-draft ship channels maintained by the Corps of Engineers. The latest controlling depths are usually shown on the charts and published in the Notices to Mariners. For other channels, the latest controlling depths available at the time of publication are given. **In all cases, however, mariners are advised to consult with pilots, port and local authorities, and Federal and State authorities for the latest channel controlling depths.**

Under-keel clearances.–It is becoming increasingly evident that economic pressures are causing mariners to navigate through waters of barely adequate depth, with under-keel clearances being finely assessed from the charted depths, predicted tide levels, and depths recorded by echo sounders.

It cannot be too strongly emphasized that even charts based on modern surveys may not show all sea-bed obstructions or the shoalest depths, and actual tide levels may be appreciably lower than those predicted.

In many ships an appreciable correction must be applied to shoal soundings recorded by echo sounders due to the horizontal distance between the transducers. This separation correction, which is the amount by which recorded depths therefore exceed true depths, increases with decreasing depths to a maximum equal to half the distance apart of the transducers; at this maximum the transducers are aground. Ships whose transducers are more than 6 feet apart should construct a table of true and recorded depths using the Traverse Tables. (Refer to discussion of echo soundings elsewhere in chapter 1.)

Other appreciable corrections, which must be applied by many ships, are for settlement and squat. These corrections depend on the depth of water below the keel, the hull form and speed of the ship.

Settlement causes the water level around the ship to be lower than would otherwise be the case. It will always cause echo soundings to be less than they would otherwise be. Settlement is appreciable when the depth is less than seven times the draft of the ship, and increases as the depth decreases and the speed increases.

Squat denotes a change in trim of a ship underway, relative to her trim when stopped. It usually causes the stern of a vessel to sit deeper in the water. However, it is reported that in the case of mammoth ships squat causes the bow to sit deeper. Depending on the location of the echo sounding transducers, this may cause the recorded depth to be greater or less than it ought to be. **Caution and common sense are continuing requirements for safe navigation.**

Distances.–These are in nautical miles unless otherwise stated. A nautical mile is one minute of latitude, or approximately 2,000 yards, and is about 1.15 statute miles.

Heights.–These are in feet above the tidal datum used for that purpose on the charts, usually mean high water. However, the heights of the decks of piers and wharves are given in feet above the chart datum for depths.

Light and fog signal characteristics.–These are not described, and light sectors and visible ranges are normally not defined. (See Coast Guard Light Lists.)

Obstructions.–Wrecks and other obstructions are mentioned only if of a relatively permanent nature and in or near normal traffic routes.

Radio aids to navigation.–These are seldom described. (See Coast Guard Light Lists and Defense Mapping Agency Hydrographic/Topographic Center Radio Navigational Aids publications.)

Ranges.–These are not fully described. **"A 339° Range"** means that the rear structure bears 339° from the front structure. (See Coast Guard Light Lists.)

Reported information.–Information received by NOS from various sources concerning depths, dangers, currents, facilities, and other subjects, which has not been verified by Government surveys or inspections, is often included in Coast Pilots; such **unverified information** is qualified as "reported", and should be regarded with caution.

Time.–Unless otherwise stated, all times are given in local standard time in the 24-hour system. (Noon is 1200, 2:00 p.m. is 1400, and midnight is 0000.)

Winds.–Directions are the true directions from which the winds blow. Unless otherwise indicated, speeds are given in knots, which are nautical miles per hour.

NOTICES TO MARINERS

Notices to Mariners are published by Federal agencies to advise operators of vessels of marine information affecting the safety of navigation. The notices include changes in aids to navigation, depths in channels, bridge and overhead cable clearances, reported dangers, and other useful marine information. They should be used routinely for updating the latest editions of nautical charts and related publications.

Local Notice to Mariners is issued by each Coast Guard District Commander for the waters under his jurisdiction. (See appendix for Coast Guard district(s) covered by this volume.) These notices are usually published weekly and may be obtained without cost by making application to the appropriate District Commander.

Notice to Mariners, published weekly by the Defense Mapping Agency Hydrographic/Topographic Center, is prepared jointly with NOS and the Coast Guard. These notices contain selected items from the Local Notices to Mariners and other reported marine information required by oceangoing vessels operating in both **foreign** and **domestic** waters. Special items covering a variety of subjects and generally not discussed in the Coast Pilot or shown on nautical charts are published annually in Notice to Mariners 1. These items are important to the mariner and should be read for future reference. The weekly notices may be obtained by operators of oceangoing vessels, without cost, by making application to Defense Mapping Agency Office of Distribution Services, Washington, D.C. 20315.

Local Notice to Mariners, relating to the **Great Lakes** and connecting waters west of Montreal, is published weekly by the Ninth Coast Guard District. These notices contain changes in aids to navigation and other marine information affecting the safety of navigation. Application for these free notices should be made to Commander, Ninth Coast Guard District, Federal Building, Cleveland, Ohio, 44199.

Notices and reports of **improved channel depths** are also published by district offices of the Corps of Engineers, U.S. Army (see appendix for districts covered by this volume). Although information from these notices/reports affecting NOS charts and related publications is usually published in the Notices to Mariners, the local district engineer office should be consulted where depth information is critical.

Marine Broadcast Notices to Mariners are made by the Coast Guard through Coast Guard, Navy, and some commercial radio stations to report deficiencies and important changes in aids to navigation. (See Radio Navigation Warnings and Weather, this chapter.)

Vessels operating within the limits of the Coast Guard districts can obtain information affecting NOS charts and related publications from the Local Notices to Mariners. Small craft using the Intracoastal Waterway and other waterways and small harbors within the United States that are not normally used by oceangoing vessels will require the Local Notices to Mariners to keep charts and related publications up-to-date. Information for oceangoing vessels can be obtained from the Notice to Mariners published by the Defense Mapping Agency Hydrographic/Topographic Center.

Notices to Mariners may be consulted at Coast Guard district offices, NOS field offices, Defense Mapping Agency Hydrographic/Topographic Center offices and depots, most local marine facilities, and sales agents handling charts and related publications.

U.S. GOVERNMENT AGENCIES PROVIDING MARITIME SERVICES

Animal and Plant Health Inspection Service, Department of Agriculture.–The Agricultural Quarantine Inspection Program and Animal Health Programs of this organization are responsible for protecting the Nation's animal population, food and fiber crops, and forests from invasion by foreign pests. They administer agricultural quarantine and restrictive orders issued under authority provided in various acts of Congress. The regulations prohibit or restrict the importation or interstate movement of live animals, meats, animal products, plants, plant products, soil, injurious insects, and associated items that may introduce or spread plant pests and animal diseases which may be new to or not widely distributed within the United States or its territories. Inspectors examine imports at ports of entry as well as the vessel, its stores, and crew or passenger baggage.

The Service also provides an inspection and certification service for exporters to assist them in meeting the quarantine requirements of foreign countries. (See appendix for a list of ports where agricultural inspectors are located and inspections conducted.)

Customs Service, Department of the Treasury.–The U.S. Customs Service administers certain laws relating to: entry and clearance of vessels and permits for certain vessel movements between points in the United States; prohibitions against coastwise transportation of passengers and merchandise; salvage, dredging and towing by foreign vessels; certain activities of vessels in the fishing trade; regular and special tonnage taxes on vessels; the landing and delivery of foreign merchandise (including unlading, appraisement, lighterage, drayage, warehousing, and shipment in bond); collection of customs duties, including duty on imported pleasure boats and yachts and 50% duty on foreign repairs to American vessels engaged in trade; customs treatment of sea and ship's stores while in port and the baggage of crewmen and passengers; illegally imported merchandise; and remission of penalties or forfeiture if customs or navigation laws have been violated. The Customs Service also cooperates with many other Federal agencies in the enforcement of statutes they are responsible for. Customs districts and ports of entry, including customs stations, are listed in the appendix.

The Customs Service may issue, without charge, a **cruising license,** valid for a period of up to 6 months and for designated U.S. waters, to a yacht of a foreign country which has a reciprocal agreement with the United States. A foreign yacht holding a cruising license may cruise in the designated U.S. waters and arrive at and depart from U.S. ports without entering or clearing at the customhouse, filing manifests, or obtaining or delivering permits to proceed, provided it does not engage in trade or violate the laws of the United States or visit a vessel not yet inspected by a Customs Agent and does, within 24 hours of arrival at each port or place in the United States, report the fact of arrival to the nearest customhouse. Countries which have reciprocal agreements granting these privileges to U.S. yachts are Argentina, Australia, Bahama Islands, Bermuda, Canada, Federal Republic of Germany, Great Britain, Greece, Honduras, Jamaica, Liberia, New Zealand, and the Netherlands. Further information concerning cruising licenses may be obtained from the headquarters port for the customs district in which the license is desired. U.S. yacht owners planning cruises to foreign ports may contact the nearest customs district headquarters as to customs requirements.

Foreign-Trade Zones, Foreign-Trade Zones Board.–U.S. foreign-trade zones are enclosed areas considered outside the Customs territory of the United States. They are the U.S. version of what are known internationally as free trade zones and are located in or near U.S. Customs ports of entry. Operated as public utilities by qualified corporations, zones function under Customs supervision. Authority for establishing these facilities is granted by the Foreign-Trade Zones Board, a Federal interagency body chaired by the Secretary of Commerce, within whose Department the Board's executive secretariat is situated.

Foreign and domestic merchandise may be moved into zones for operations not otherwise prohibited by law involving storage, exhibition, assembly, manufacture, or other processing. The usual formal Customs entry procedure and payment of duties is not required on the foreign merchandise unless and until it enters Customs territory for domestic consumption, in which case the importer has a choice of paying duties either on the original foreign materials or the finished product. Quota restrictions do not normally apply to foreign goods in zones. Domestic goods moved into a zone for export are considered exported upon entering the zone for purposes of excise tax rebates and drawback. (See appendix for addresses of Foreign-Trade Zones covered by this Coast Pilot.

National Ocean Survey (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.–The National Ocean Survey provides charts and related publications for the safe navigation of marine and air commerce, and provides basic data for engineering and scientific purposes and for other commercial and industrial needs. The principal facilities of NOS are located in Rockville, Md. (headquarters); in Norfolk, Va. (Atlantic Marine Center); and in Seattle, Wash. (Pacific Marine Center). NOAA ships are based at the marine centers. These offices maintain files of charts and other publications which are available for the use of the mariners, who are invited to avail themselves of the facilities afforded. (See appendix for addresses.)

Sales agents for Charts, Coast Pilots, Tide Tables, Tidal Current Tables, Tidal Current Diagrams, and Tidal Current Charts of the National Ocean Survey are located in many U.S. ports and in some foreign ports. A list of authorized sales agents and chart catalogs may be had free upon request from National Ocean Survey, Distribution Division (OA/C44), 6501 Lafayette Avenue, Riverdale, Md. 20737.

Nautical Charts are published primarily for the use of the mariner, but serve the public interest in many other ways. They are compiled principally from NOS basic field surveys, supplemented by data from other Government organizations.

Tide Tables are issued annually by NOS in advance of the year for which they are prepared. These tables include predicted times and heights of high and low waters for every day in the year for a number of reference stations and differences for obtaining similar predictions for numerous other places. They also include other useful information such as a method of obtaining heights of tide at any time, local mean time of sunrise and sunset for various latitudes, reduction of local mean time to standard time, and time of moonrise and moonset for various ports.

Caution.–In using the Tide Tables, slack water should not be confused with high or low water. For ocean stations there is usually little difference between the time of high or low water and the beginning of ebb or flood currents; but for places in narrow channels, landlocked harbors, or on tidal rivers, the time of slack current may differ by several hours from the time of high or low water. The relation of the times of high or low water to the turning of the current depends upon a number of factors, so that no simple general rule can be given. (To obtain the times of slack water, refer to the Tidal Current Tables.)

Tidal Current Tables for the coasts of the United States are issued annually by NOS in advance of the year for which they are prepared. These tables include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb currents for a number of waterways, together with differences for obtaining predictions for numerous other places. Also included is other useful information such as a method for obtaining the velocity of current at any time, duration of slack, coastal tidal currents, wind currents, combination of currents, and current diagrams. Some information on the Gulf Stream is included in the tables for the Atlantic coast.

Tidal Current Charts are published by NOS for various localities. These charts depict the direction and velocity of the current for each hour of the tidal cycle. They present a comprehensive view of the tidal current movement in the respective waterways as a whole and when used with the proper current tables or tide tables supply a means for readily determining for any time the direction and velocity of the current at various localities throughout the areas covered.

Tidal Current Diagrams, published annually by NOS, are a series of 12 monthly computer constructed diagrams used in conjunction with the Tidal Current Charts for a particular area. The diagrams present an alternate but more simplified method for calculating the speed and direction of the tidal currents in bays, estuaries, and harbors.

Coast Guard, Department of Transportation.–The Coast Guard has among its duties the enforcement of the laws of the United States on the high seas and in coastal and inland waters of the United States and its possessions; enforcement of navigation and neutrality laws and regulations; establishment and enforcement of navigational regulations upon the Inland Waters of the United States, including the establishment of a demarcation line separating the high seas from waters upon which U.S. navigational rules apply; administration of the Oil Pollution Act of 1961, as amended; establishment and administration of vessel anchorages; approval of bridge locations and clearances over navigable waters; administration of the alteration of obstructive bridges; regulation of drawbridge operations; inspection of vessels of the Merchant Marine; admeasurement of vessels; documentation of vessels; preparation and publication of merchant vessel registers; registration of stack insignia; port security; issuance of Merchant Marine licenses and documents; search and rescue operations; investigation of marine casualties and accidents, and suspension and revocation proceedings; destruction of derelicts; operation of aids to navigation; publication of Light Lists and Local Notices to Mariners; and operation of ice-breaking facilities.

The Coast Guard, with the cooperation of coast radio stations of many nations, operates the **Automated Mutual-assistance Vessel Rescue System (AMVER).** It is an international maritime mutual assistance program which provides important aid to the development and coordination of search and rescue (SAR) efforts in many offshore areas of the world. Merchant ships of all nations making offshore passages are encouraged to voluntarily send movement (sailing) reports and periodic position reports to the AMVER Center at Coast Guard New York via selected radio stations. Information from these reports is entered into an electronic computer which generates and maintains dead reckoning positions for the vessels. Characteristics of vessels which are valuable for determining SAR capability are also entered into the computer from available sources of information.

Information concerning the predicted location and SAR characteristics of each vessel known to be within the area of interest is made available upon request to recognized SAR agencies of any nation or vessels needing assistance. Predicted locations are only disclosed for reasons related to marine safety.

Messages sent within the AMVER System are at no costs to the ship or owner. Benefits to shipping include: (1) improved chances of aid in emergencies, (2) reduced number of calls for assistance to vessels not favorably located, and (3) reduced time lost for vessels responding to calls for assistance. An AMVER participant is under no greater obligation to render assistance during an emergency than a vessel who is not participating.

All AMVER messages should be addressed to **Coast Guard New York** regardless of the station to which the message is delivered, except those sent to Canadian stations which should be addressed to **AMVER Halifax** or **AMVER Vancouver,** to avoid incurring charges to the vessel for these messages.

Instructions guiding participation in the AMVER System are available in the following languages: Chinese, Danish, Dutch, English, French, German, Greek, Italian, Japanese, Korean, Polish, Norwegian, Portuguese, Russian, Spanish, and Swedish. They are available from: Commander, Atlantic Area, U.S. Coast Guard, Governors Island, N.Y. 10004; Commander, Pacific Area, U.S. Coast Guard, 630 Sansome Street, San Francisco, Calif. 94126; and at U.S. Coast Guard District Offices, Marine Safety Offices, Marine Inspection Offices, and Captain of the Port Offices in major U.S. ports. Requests for instructions should state the language desired if other than English.

For AMVER participants bound for U.S. ports there is an additional benefit. AMVER participation via messages which include the necessary information is considered to meet the requirements of 33 CFR 161. (See 161.1, chapter 2, for rules and regulations.)

Search and Rescue Operation procedures are contained in the Inter-Governmental Maritime Consultative Organization (IMCO) SAR Manual (MERSAR). U.S. flag vessels may obtain a copy of MERSAR from local Coast Guard Marine Safety Offices and Marine Inspection Offices or by writing to U.S. Coast Guard (G-OSR), Washington, D.C. 20593. Other flag vessels may purchase MERSAR directly from IMCO.

The Coast Guard conducts and/or coordinates **search and rescue** operations for surface vessels and aircraft that are in distress or overdue. (See Distress Signals and Communication Procedures this chapter.)

Light Lists, published by the Coast Guard, describe aids to navigation, consisting of lights, fog signals, buoys, lightships, daybeacons, and electronic aids, in United States (including Puerto Rico and U.S. Virgin Islands) and contiguous Canadian waters. Light Lists are for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, and by sales agents in the principal seaports. Mariners should refer to these publications for detailed information regarding the characteristics and visibility of lights, and the descriptions of light structures, lightships, buoys, fog signals, and electronic aids.

Documentation (issuance of certificates of registry, enrollments, and licenses), admeasurements of vessels, and administration of the various navigation laws pertaining thereto are functions of the Coast Guard. Yacht commissions are also issued, and certain undocumented vessels required to be numbered by the Federal Boat Safety Act of 1971 are numbered either by the Coast Guard or by a State having an approved numbering system (the latter is most common). Owners of vessels may obtain the necessary information from any Coast Guard District Commander, Marine Safety Office, or Marine Inspection Office. Coast Guard District Offices, Coast Guard Stations, Marine Safety Offices, Captain of the Port Offices, Marine Inspection Offices, and Documentation Offices are listed in the appendix. (Note: A Marine Safety Office performs the same functions as those of a Captain of the Port, a Marine Inspection Office, and a Documentation Office, although these functions may not be all at the same address. When a function is at a different address than the Marine Safety Office, it will be listed separately in the appendix.)

Corps of Engineers, Department of the Army.–The Corps of Engineers has charge of the improvement of the rivers and harbors of the United States and of miscellaneous other civil works which include the administration of certain Federal laws enacted for the protection and preservation of navigable waters of the United States; the establishment of regulations for the use, administration, and navigation of navigable waters; the establishment of harbor lines; the removal of sunken vessels obstructing or endangering navigation; and the granting of permits for structures or operations in navigable waters, and for discharges and deposits of dredged and fill materials in these waters.

Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the areas under their jurisdiction may be obtained direct from the District Engineer offices. (See appendix for addresses.)

Restricted areas in most places are defined and regulations governing them are established by the Corps of Engineers. The regulations are enforced by the authority designated in the regulations, and the areas are shown on the large-scale charts of NOS. Copies of the regulations may be obtained at the District offices of the Corps of Engineers. The regulations also are included in the appropriate Coast Pilots.

Fishtraps.–The Corps of Engineers has general supervision of location, construction, and manner of maintenance of all traps, weirs, pounds, or other fishing structures in the navigable waters of the United States. Where State and/or local controls are sufficient to regulate these structures, including that they do not interfere with navigation, the Corps of Engineers leaves such regulation to the State or local authority. (See 33 CFR 206 (not carried in this Pilot) for applicable Federal regulations.) Construction permits issued by the Engineers specify the lights and signals required for the safety of navigation.

Fish havens, artificial reefs constructed to attract fish, can be established in U.S. coastal waters only as authorized by a Corps of Engineers permit; the permit specifies the location, extent, and depth over these "underwater junk piles".

Environmental Protection Agency (EPA).–The U.S. Environmental Protection Agency provides coordinated governmental action to assure the protection of the environment by abating and controlling pollution on a systematic basis. The ocean dumping permit program of the Environmental Protection Agency provides that except when authorized by permit, the dumping of any material into the ocean is prohibited by the "Marine Protection, Research, and Sanctuaries Act of 1972, Public Law 92-532," as amended (33 USC 1401 et seq.).

Permits for the dumping of dredged material into waters of the United States, including the territorial sea, and into ocean waters are issued by the Corps of Engineers. Permits for the dumping of fill material into waters of the United States, including the territorial sea, are also issued by the Corps of Engineers. Permits for the dumping of other material in the territorial sea and ocean waters are issued by the Environmental Protection Agency.

Corps of Engineers regulations relating to the above are contained in 33 CFR 323-324; Environmental Protection Agency regulations are in 40 CFR 220-229. (See Dump Sites this chapter.)

Persons or organizations who want to file for an application for an ocean dumping permit should write the Environmental Protection Agency Regional Office for the region in which the port of departure is located. (See appendix for addresses of regional offices and States in the EPA coastal regions.)

The letter should contain the name and address of the applicant; name and address of person or firm; the name and usual location of the conveyance to be used in the transportation and dumping of the material involved; a physical description where appropriate; and the quantity to be dumped and proposed dumping site.

Everyone who writes EPA will be sent information about a final application for a permit as soon as possible. This final application is expected to include questions about the description of the process or activity giving rise to the production of the dumping material; information on past activities of applicant or others with respect to the disposal of the type of material involved; and a description about available alternative means of disposal of the material with explanations about why an alternative is thought by the applicant to be inappropriate.

Federal Communications Commission.–The Federal Communications Commission controls non-Government radio communications in the United States, Guam, Puerto Rico, and the Virgin Islands. Commission inspectors have authority to board ships to determine whether their radio stations comply with international treaties, Federal Laws, and Commission regulations. The commission has field offices in the principal U.S. ports. (See appendix for addresses.) Information concerning ship radio regulations and service documents may be obtained from the Federal Communications Commission, Washington, D.C. 20554, or from any of the field offices.

Immigration and Naturalization Service, Department of Justice.–The Immigration and Naturalization Service administers the laws relating to admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

The designated ports of entry for aliens are divided into three classes. Class A is for all aliens. Class B is only for aliens who at the time of applying for admission are lawfully in possession of valid resident aliens' border-crossing identification cards or valid nonresident aliens' border-crossing identification cards or are admissible without documents under the documentary waivers contained in 8 CFR 212.1 (a). Class C is only for aliens who are arriving in the United States as crewmen as that term is defined in Section 101 (a) (10) of the Immigration and Nationality Act. (The term "crewman" means a person serving in any capacity on board a vessel or aircraft.) No person may enter the United States until he has been inspected by an immigration officer. A list of the offices covered by this Coast Pilot is given in the appendix.

Defense Mapping Agency Hydrographic/Topographic Center (DMAHTC), Department of Defense.–The Defense Mapping Agency Hydrographic/Topographic Center provides hydrographic, navigational, topographic, and geodetic data, charts, maps, and related products and services to the Armed Forces, other Federal Agencies, the Merchant Marine and mariners in general. Publications include Sailing Directions (pilots), Light Lists, Table of Distances, Radio Navigational Aids, International Code of Signals, American Practical Navigator (Bowditch), and the Notice to Mariners published weekly. Sales of all DMAHTC products are handled by the Defense Mapping Agency Office of Distribution Services.

Public Health Service, Department of Health and

Human Services.–The Public Health Service administers hospitalization and outpatient treatment to designated beneficiaries of the government and administers foreign quarantine procedures at U.S. ports of entry.

All vessels arriving in the United States are subject to public health inspection. Only the following vessels are subject to **routine boarding** for quarantine inspection upon arrival: (a) vessels which have been in a smallpox-infected country in the 15 days prior to arrival; (b) vessels which have been in a plague-infected country within 60 days prior to arrival; (c) vessels which have had on board during the 15 days preceeding arrival any of the following signs of **illness:**

1. Temperature of 100°F (38°C) or greater which was accompanied or followed by any one or all of the following: rash, jaundice, glandular swelling; or
2. Diarrhea severe enough to interfere with work or normal activity.
3. Death, regardless of the foregoing criteria.

Masters of vessels having illness aboard compatible with the above criteria must provide radio notification of the illness through their agent to the quarantine station at the intended U.S. port of arrival.

Vessels arriving at ports under control of the United States are subject to **sanitary inspection** to determine whether measures should be applied to prevent the introduction, transmission, or spread of communicable disease.

Specific public health laws, regulations, policies, and procedures may be obtained by contacting U. S. Quarantine Stations, U.S. Consulates or the Chief, Quarantine Branch, Bureau of Epidemiology, Center for Disease Control, Atlanta, Ga. 30333. (See appendix for addresses of U.S. Public Health Service Quarantine Stations.)

Food and Drug Administration (FDA), Public Health Service, Department of Health and Human Services.–Under the provisions of the Control of Communicable Diseases Regulations (21 CFR 1240) and Interstate Conveyance Sanitation Regulations (21 CFR 1250), vessel companies operating in interstate traffic shall obtain potable water for drinking and culinary purposes only at watering points found acceptable to the Food and Drug Administration. Water supplies used in watering point operations must also be inspected to determine compliance with applicable Interstate Quarantine Regulations (42 CFR 72). These regulations are based on authority contained in the Public Health Service Act (PL 78–410). Penalties for violation of any regulation prescribed under authority of the Act are provided for under Section 368 (42 USC 271) of the Act.

FDA publishes a list of **Acceptable Vessel Watering Points** as of January 1 each year. This list is available from most FDA offices or from the Interstate Travel Sanitation Subprogram, FDA, HFF-312, 200 C Street SW., Washington, D.C. 20204. Since the acceptability of watering points may have changed since January 1, their current status must be obtained by contacting any FDA office. (See appendix for addresses.)

National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.–The National Weather Service provides marine weather forecasts and warnings for the U.S. coastal waters, the Great Lakes, offshore waters, and high seas areas. Scheduled marine forecasts are issued four times daily from more than 20 **National Weather Service Forecast Offices (WSFO's)** around the country, operating 24 hours a day. Marine services are also provided by over 50 **National Weather Service Offices** with local areas of responsibility. (See appendix for Weather Service Forecast Offices and Weather Service Offices for the area covered by this Coast Pilot.)

Typically, the forecasts contain information on wind speed and direction, wave heights, visibility, weather, and a general synopsis of weather patterns affecting the region. The forecasts are supplemented with special marine warnings and statements, radar summaries, marine observations, small-craft advisories, gale warnings, storm warnings and various categories of tropical cyclone warnings e.g., tropical depression, tropical storm and hurricane warnings. Specialized products such as coastal flood, seiche, and tsunami warnings, heavy surf advisories, low water statements, ice forecasts and outlooks, and lake shore warnings and statements, are issued as necessary.

The principal means of disseminating marine weather services and products in coastal areas is **NOAA Weather Radio.** This network of more than 350 stations nationwide is operated by the NWS and provides continuous broadcasts of weather information for the general public. These broadcasts repeat taped messages every 4–6 minutes. Tapes are updated periodically, usually every 2–3 hours and amended as required to include the latest information. When severe weather threatens, routine transmissions are interrupted and the broadcast is devoted to emergency warnings. (See appendix for NOAA Weather Radio Stations covered by this Coast Pilot.)

In coastal areas, the programming is tailored to the needs of the marine community. Each coastal marine forecast covers a specific area. For example, "Cape Henlopen to Virginia Beach, out 20 miles." The broadcast range is about 40 miles from the transmitting antenna site, depending on terrain and quality of the receiver used. When transmitting antennas are on high ground, the range is somewhat greater, reaching 60 miles or more. Some receivers are equipped with a warning alert device that can be turned on by means of a tone signal controlled by the NWS office concerned. This signal is transmitted for 13 seconds preceding an announcement of a severe weather warning.

Marine weather warnings are displayed to small-craft operators and others within sight of the shore by the flags, pennants, and lights of the **Coastal**

Warning Display program. This means of receiving marine warnings is the least efficient because of the limited visual range of the display and problems in hoisting and lowering the display promptly. The Coastal Warning Display program is being de-emphasized as small-boat operators and coastal residents are urged to rely instead on low cost, portable NOAA Weather Radio receivers.

NWS marine weather products are also disseminated to marine users through the broadcast facilities of the Coast Guard, Navy, National Bureau of Standards, National Marine Fisheries Service, certain Sea Grant Universities, and commercial marine radio stations. Details on these broadcasts including times, frequencies, and broadcast content are listed in the joint NWS/Navy publication Worldwide Marine Weather Broadcasts. For marine weather services in the coastal areas, the NWS publishes a series of Marine Weather Services Charts showing locations of NOAA Weather Radio stations, Coastal Warning Display sites, telephone numbers of recorded weather messages and NWS offices, and other useful marine weather information.

Ships of all nations share equally in the effort to report weather observations. These reports enable meteorologists to create a detailed picture of wind, wave, and weather patterns over the open waters that no other data source can provide and upon which marine forecasts are based. The effectiveness and reliability of these forecasts and warnings plus other services to the marine community are strongly linked to the observations received from mariners. There is an especially urgent need for ship observations in the coastal waters, and the NWS asks that these be made and transmitted whenever possible. Many storms originate and intensify in coastal areas. There may be a great difference in both wind direction and speed between the open sea, the offshore waters, and on the coast itself.

Information on how ships, commercial fishermen, offshore industries, and others in the coastal zone may participate in the marine observation program is available from **National Weather Service Port Meteorological Officers (PMO's).** Port Meteorological Officers are located in major U.S. port cities and the Republic of Panama, where they visit ships in port to assist masters and mates with the weather observation program, provide instruction on the interpretation of weather charts, calibrate barometers and other meteorological instruments, and discuss marine weather communications and marine weather requirements affecting the ships' operations. (See appendix for addresses of Port Meteorological Officers in or near the area covered by this Coast Pilot.)

Environmental Data and Information Service (EDIS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce. - Among its functions, EDIS archives, processes, and disseminates the non-realtime meteorological and oceanographic data collected by government agencies and private institutions. Marine weather observations are collected from ships at sea on a voluntary basis. About 1 million observations are received annually at EDIS's National Climatic Center. They come from vessels representing every maritime nation. These observations, along with land data, are returned to the mariners in the form of climatological summaries and atlases for coastal and ocean areas. They are available in such NOAA publications as the **U.S. Coast Pilots, Mariners Weather Log,** and **Local Climatological Data, Annual Summary.** They also appear in the Defense Mapping Agency Hydrographic/Topographic Center's **Pilot Charts** and **Sailing Directions Planning Guides.**

DISTRESS SIGNALS AND COMMUNICATION PROCEDURES

Coast Guard search and rescue operations.–The Coast Guard conducts and/or coordinates search and rescue operations for surface vessels or aircraft that are in distress or overdue. Search and Rescue vessels and aircraft have special markings, including a wide slash of red-orange and a small slash of blue on the forward portion of the hull or fuselage. Other parts of aircraft, normally painted white, may have other areas painted red to facilitate observation. The cooperation of vessel operators with Coast Guard helicopters, fixed-wing aircraft, and vessels may mean the difference between life and death for some seaman or aviator; such cooperation is greatly facilitated by the prior knowledge on the part of vessel operators of the operational requirements of Coast Guard equipment and personnel, of the international distress signals and procedures, and of good seamanship.

International distress signals.–(1) A signal made by radiotelegraphy or by any other signalling method consisting of the group "SOS" in Morse Code.

(2) A signal sent by radiotelephony consisting of the spoken word "MAYDAY".

(3) The International Flag Code Signal of NC.

(4) A signal consisting of a square flag having above or below it a ball or anything resembling a ball.

(5) Flames on the craft (as from a burning oil barrel, etc.)

(6) A rocket parachute flare or hand flare showing a red light.

(7) Rockets or shells, throwing red stars fired one at a time at short intervals.

(8) Orange smoke, as emitted from a distress flare.

(9) Slowly and repeatedly raising and lowering arms outstretched to each side.

(10) A gun or other explosive signal fired at intervals of about 1 minute.

(11) A continuous sounding of any fog-signal apparatus.

(12) The radiotelegraph alarm signal.

(13) The radiotelephone alarm signal.

(14) Signals transmitted by emergency position-indicating radiobeacons.

(15) A piece of orange-colored canvas with ei-

ther a black square and circle or other appropriate symbol (for identification from the air).

(16) A dye marker.

Radio distress procedures.–Distress calls are made on 500 kHz (SOS) for radiotelegraphy and on 2182 kHz or channel 16 (156.80 MHz) VHF-FM (MAYDAY) for radiotelephony. For less serious situations than warrant the distress procedure, the urgency signal PAN (PAHN, spoken three times), or the safety signal SECURITY (SAY-CURITAY, spoken three times), for radiotelephony, are used as appropriate. Since radiotelegraph transmissions are normally made by professional operators, and urgency and safety situations are less critical, only the distress procedures for voice radiotelephone are described. For complete information on emergency radio procedures, see Pubs. 117A, 117B, or 47 CFR 83. **(See appendix for a list of Coast Guard Stations which guard 2182 kHz and 156.80 MHz.)** Complete information on distress guards can be obtained from Coast Guard District Commanders.

Distress calls indicate a vessel or aircraft is threatened by grave and imminent danger and requests immediate assistance. They have absolute priority over all other transmissions. All stations which hear a distress call must immediately cease any transmission capable of interfering with the distress traffic and shall continue to listen on the frequency used for the emission of the distress call. This call shall not be addressed to a particular station, and acknowledgement of receipt shall not be given before the distress message which follows it is sent.

Radiotelephone distress communications include the following actions:

(1) The **radiotelephone alarm signal** (if available): The signal consists of two audio tones, of different pitch, transmitted alternately; its purpose is to attract the attention of persons on radio watch or to actuate automatic alarm devices. It may only be used to announce that a distress call or message is about to follow.

(2) The **distress call,** consisting of:–the distress signal MAYDAY (spoken three times);

the words THIS IS (spoken once);

the call sign or name of the vessel in distress (spoken three times).

(3) The **distress message** follows immediately and consists of:

the distress signal MAYDAY:

The call sign and name of the vessel in distress;

particulars of its position (latitude and longitude, or true bearing and distance from a known geographical position);

the nature of the distress;

the kind of assistance desired;

the number of persons aboard and the condition of any injured;

present seaworthiness of vessel;

description of the vessel (length; type; cabin; masts; power; color of hull, superstructure, trim; etc.);

any other information which might facilitate the rescue, such as display of a surface-to-air identification signal or a radar reflector;

your listening frequency and schedule;

THIS IS (call sign and name of vessel in distress). OVER.

(4) **Acknowledgement of receipt of a distress message:** If a distress message is received from a vessel which is definitely in your vicinity, immediately acknowledge receipt. If it is not in your vicinity, allow a short interval of time to elapse before acknowledging, in order to permit vessels nearer to the vessel in distress to acknowledge receipt without interference. However, in areas where reliable communications with one or more shore stations are practicable, all vessels may defer this acknowledgement for a short interval so that a shore station may acknowledge receipt first. The acknowledgement of receipt of a distress is given as follows:

the call sign or name of the vessel sending the distress (spoken three times);

the words THIS IS;

the call sign or name of acknowledging vessel (spoken three times);

The words RECEIVED MAYDAY.

After the above acknowledgement, allow a momentary interval of listening to insure that you will not interfere with another vessel better situated to render immediate assistance; if not, with the authority of the person in charge of the vessel, transmit:

the word MAYDAY;

the call sign and name of distressed vessel;

the words THIS IS;

the call sign and name of your vessel;

your position (latitude and longitude, or true bearing and distance from a known geographical position);

the speed you are proceeding towards, and the approximate time it will take to reach, the distressed vessel. OVER.

(5) **Further distress messages and other communications:** Distress communications consist of all messages relating to the immediate assistance required by the distressed vessel. Each distress communication shall be preceded by the signal MAYDAY. The vessel in distress or the station in control of distress communications may **impose silence** on any station which interferes. The procedure is:–the words SEELONCE MAYDAY (Seelonce is French for silence). Silence also may be imposed by nearby mobile stations other than the vessel in distress or the station in control of distress communications. The mobile station which believes that silence is essential may request silence by the following procedure:–the word SEELONCE, followed by the word DISTRESS, and its own call sign.

(6) **Transmission of the distress procedure by a vessel or shore station not itself in distress:** A vessel or a shore station which learns that a vessel is in distress shall transmit a distress message in any of the following cases:

(a) **When the vessel in distress is not itself able to transmit the distress message.**

(b) When a vessel or a shore station considers that further help is necessary.

(c) When, although not in a position to render assistance, it has heard a distress message that has not been acknowledged.

In these cases, the transmission shall consist of:

the radiotelephone alarm signal (if available);

the words MAYDAY RELAY (spoken three times);

the words THIS IS;

the call sign and name of vessel (or shore station), spoken three times.

When a vessel transmits a distress under these conditions, it shall take all necessary steps to contact the Coast Guard or a shore station which can notify the Coast Guard.

(7) **Termination of distress:** When distress traffic has ceased, or when silence is no longer necessary on the frequency used for the distress traffic, the station in control shall transmit on that frequency a message to all stations as follows:

the distress signal MAYDAY;

the call TO ALL STATIONS, spoken three times;

the words THIS IS;

the call sign and name of the station sending the message;

the time;

the name and call sign of the vessel in distress;

the words SEELONCE FEENEE (French for silence finished).

DISTRESS ASSISTANCE AND COORDINATION PROCEDURES

Surface ship procedures for assisting distressed surface vessels.

(1) The following immediate action should be taken by each ship on receipt of a distress message:

(a) Acknowledge receipt and, if appropriate, retransmit the distress message;

(b) Immediately try to take D/F bearings during the transmission of the distress message and maintain a D/F watch on 500 kHz and/or 2182 kHz;

(c) Communicate the following information to the ship in distress:

(i) identity;

(ii) position;

(iii) speed and estimated time of arrival (ETA);

(iv) when available, true bearing of the ship in distress.

(d) Maintain a continuous listening watch on the frequency used for the distress. This will normally be:

(i) 500 kHz (radiotelegraphy) and/or

(ii) 2182 kHz (radiotelephony).

(e) Additionally, maintain watch on VHF-FM channel 16 (156.80 MHz) as necessary;

(f) Operate radar continuously;

(g) If in the vicinity of the distress, post extra lookouts.

(2) The following action should be taken when proceeding to the area of distress:

(a) Plot the position, course, speed, and ETA of other assisting ships.

(b) Know the communication equipment with which other ships are fitted. This information may be obtained from the International Telecommunication Union's List of Ship Stations.

(c) Attempt to construct an accurate "picture" of the circumstances attending the casualty. The important information needed is included under Distress Signals and Communication Procedures, this chapter. Should the ship in distress fail to transmit this information, a ship proceeding to assist should request what information is needed.

(3) The following on-board preparation while proceeding to the distress area should be considered:

(a) A rope (guest warp) running from bow to quarter at the waterline on each side and secured by lizards to the ship's side to assist boats and rafts to secure alongside;

(b) A derrick rigged ready for hoisting on each side of the ship with a platform cargo sling, or rope net, secured to the runner to assist the speedy recovery of exhausted or injured survivors in the water;

(c) Heaving lines, ladders, and scramble net placed ready for use along both sides of the ship on the lowest open deck and possibly crew members suitably equipped to enter the water and assist survivors;

(d) A ship's liferaft made ready for possible use as a boarding station;

(e) Preparations to receive survivors who require medical assistance including the provision of stretchers;

(f) When own lifeboat is to be launched, any means to provide communications between it and the parent ship will prove to be of very great help;

(g) A line throwing appliance with a light line and a heavy rope, ready to be used for making connection either with the ship in distress or with survival craft.

Aircraft procedures for directing surface craft to scene of distress incident.–The following procedures performed in sequence by an aircraft mean that the aircraft is directing a surface craft toward the scene of a distress incident,

(a) Circling the surface craft at least once.

(b) Crossing the projected course of the surface craft close ahead at low altitude, rocking the wings, opening and closing the throttle, or changing the propeller pitch.

(c) Heading in the direction in which the surface craft is to be directed. The surface craft should acknowledge the signal by changing course and following the aircraft. If, for any reason, it is impossible to follow, the surface craft should hoist the international code flag NOVEMBER, or use any other signaling means available to indicate this.

The following procedures performed by an aircraft mean that the assistance of the surface craft is no longer required:

(a) Crossing the wake of the surface craft close astern at a low altitude, rocking the wings, opening and closing the throttle or changing the propeller pitch.

Since modern jet-engined aircraft cannot make the characteristic sound associated with opening and closing the throttle, or changing propeller pitch, ships should be alert to respond to the signals without the sounds, when jets or turboprop aircraft are involved.

Surface ship procedures for assisting aircraft in distress.–1. When an aircraft transmits a distress message by radio, the first transmission is generally made on the designated air/ground enroute frequency in use at the time between the aircraft and aeronautical station. The aircraft may change to another frequency, possibly another enroute frequency or the aeronautical emergency frequencies of 121.50 MHz or 243 MHz. In an emergency, it may use any other available frequency to establish contact with any land, mobile, or direction-finding station.

2. There is liaison between Coast Radio Stations aeronautical units, and land-based search and rescue organizations. Merchant ships will ordinarily be informed of aircraft casualties at sea by broadcast messages from Coast Radio Stations, made on the international distress frequencies of 500 kHz and 2182 kHz. Ships may, however, become aware of the casualty by receiving:

(a) An SOS message from an aircraft in distress which is able to transmit on 500 kHz or a distress signal from an aircraft using radiotelephone on 2182 kHz.

(b) A radiotelegraphy distress signal on 500 kHz from a hand-operated emergency transmitter carried by some aircraft.

(c) A message from a SAR aircraft.

3. For the purpose of emergency communications with aircraft, special attention is called to the possibility of conducting direct communications on 2182 kHz, if both ship and aircraft are so equipped.

4. An aircraft in distress will use any means at its disposal to attract attention, make known its position, and obtain help, including some of the signals prescribed by the International Regulations for Preventing Collisions at Sea.

5. Aircraft usually sink quickly (e.g. within a few minutes). Every endeavor will be made to give ships an accurate position of an aircraft which desires to ditch. When given such a position, a ship should at once consult any other ships in the vicinity on the best procedure to be adopted. The ship going to the rescue should answer the station sending the broadcast and give her identity, position, and intended action.

6. If a ship should receive a distress message direct from an aircraft, she should act as indicated in the immediately preceding paragraph and also relay the message to the nearest Coast Radio Station. Moreover, a ship which has received a distress message direct from an aircraft and is going to the rescue should take a bearing on the transmission and inform the Coast Radio Station and other ships in the vicinity of the call sign of the distressed aircraft and the time at which the distress message was received, followed by the bearing and time at which the signal ceased.

7. When an aircraft decides to ditch in the vicinity of a ship, the ship should:

(a) Transmit homing bearings to the aircraft, or (if so required) transmit signals enabling the aircraft to take its own bearings.

(b) By day, make black smoke.

(c) By night, direct a searchlight vertically and turn on all deck lights. Care must be taken not to direct a searchlight toward the aircraft, which might dazzle the pilot.

8. Ditching an aircraft is difficult and dangerous. A ship which knows that an aircraft intends to ditch should be prepared to give the pilot the following information:

(a) Wind direction and force.

(b) Direction, height, and length of primary and secondary swell systems.

(c) Other pertinent weather information.

The pilot of an aircraft will choose his own ditching heading. If this is known by the ship, she should set course parallel to the ditching heading. Otherwise the ship should set course parallel to the main swell system and into the wind component, if any.

9. A land plane may break up immediately on striking the water, and liferafts may be damaged. The ship, should, therefore, have a lifeboat ready for launching, and if possible, boarding nets should be lowered from the ship and heaving lines made ready in the ship and the lifeboat. Survivors of the aircraft may have bright colored lifejackets and location aids.

10. The method of recovering survivors must be left to the judgment of the master of the ship carrying out the rescue operation.

11. It should be borne in mind that military aircraft are often fitted with ejection seat mechanisms. Normally, their aircrew will use their ejection seats, rather than ditch. Should such an aircraft ditch, rather than the aircrew bail out, and it becomes necessary to remove them from their ejection seats while still in the aircraft, care should be taken to avoid triggering off the seat mechanisms. The activating handles are invariably indicated by red and or black/yellow coloring.

12. A survivor from an aircraft casualty who is recovered may be able to give information which will assist in the rescue of other survivors. Masters are therefore asked to put the following questions to survivors and to communicate the answers to a Coast Radio Station. They should also give the position of the rescuing ship and the time when the survivors were recovered.

(a) What was the time and date of the casualty?

(b) Did you bail out or was the aircraft ditched?

(c) If you bailed out, at what altitude?

(d) How many others did you see leave the aircraft by parachute?

(e) How many ditched with the aircraft?

(f) How many did you see leave the aircraft after ditching?

(g) How many survivors did you see in the water?

(h) What flotation gear had they?

(i) What was the total number of persons aboard the aircraft prior to the accident?

(j) What caused the emergency?

Helicopter evacuation of personnel.–Helicopter evacuation, usually performed by the Coast Guard, is a hazardous operation to the patient and to the flight crew, and should only be attempted in event of very serious illness or injury. Provide the doctor on shore with all the information you can concerning the patient, so that an intelligent evaluation can be made concerning the need for evacuation. Most rescue helicopters can proceed less than 150 miles offshore (a few new helicopters can travel 250 to 300 miles out to sea), dependent on weather conditions and other variables. If an evacuation is necessary, the vessel must be prepared to proceed within range of the helicopter, and should be familiar with the preparations which are necessary prior to and after its arrival.

When requesting helicopter assistance:

(1) Give the accurate position, time, speed, course, weather conditions, sea conditions, wind direction and velocity, type of vessel, and voice and CW frequency for your ship.

(2) If not already provided, give complete medical information including whether or not the patient is ambulatory.

(3) If you are beyond helicopter range, advise your diversion intentions so that a rendezvous point may be selected.

(4) If there are changes to any items reported earlier, advise the rescue agency immediately. Should the patient die before the arrival of the helicopter, be sure to advise those assisting you.

Preparations prior to the arrival of the helicopter:

(1) Provide continuous radio guard on 2182 kHz or specified voice frequency, if possible. The helicopter normally cannot operate CW.

(2) Select and clear the most suitable hoist area, preferably aft on the vessel with a minimum of 50 feet radius of clear deck. This must include the securing of loose gear, awnings, and antenna wires. Trice up running rigging and booms. If hoist is aft, lower the flag staff.

(3) If the hoist is to take place at night, light the pickup areas as well as possible. Be sure you do not shine any lights on the helicopter, so that the pilot is not blinded. If there are any obstructions in the vicinity, put a light on them so the pilot will be aware of their positions.

(4) Point searchlights vertically to aid the flight crew in locating the ship and turn them off when the helicopter is on the scene.

(5) Be sure to advise the helicopter of the location of the pickup area on the ship before the helicopter arrives, so that the pilot may make his approach to aft, amidships, or forward, as required.

(6) There will be a high noise level under the helicopter, so voice communications on deck are almost impossible. Arrange a set of hand signals among the crew who will assist.

Hoist operations:

(1) If possible, have the patient moved to a position as close to the hoist area as his condition will permit–**time is important.**

(2) Normally, if a litter (stretcher) is required, it will be necessary to move the patient to the special litter which will be lowered by the helicopter. Be prepared to do this as quickly as possible. Be sure the patient is strapped in, face up, and with a life jacket on (if his condition will permit).

(3) Be sure that the patient is tagged to indicate what medication, if any, was administered to him and when it was administered.

(4) Have patient's medical record and necessary papers in an envelope or package ready for transfer with the patient.

(5) Again, if the patient's condition permits, be sure he is wearing a life jacket.

(6) Change the vessel's course to permit the ship to ride as easily as possible with the wind on the bow, preferably on the port bow. Try to choose a course to keep the stack gases clear of the hoist area. Once established, maintain course and speed.

(7) Reduce speed to ease ship's motion, but maintain steerageway.

(8) If you do not have radio contact with the helicopter, when you are in all respects ready for the hoist, signal the helicopter in with a "come on" with your hand, or at night by flashlight signals.

(9) **Allow basket or stretcher to touch deck prior to handling to avoid static shock.**

(10) If a trail line is dropped by the helicopter, guide the basket or stretcher to the deck with the line; keep the line free at all times. This line will not cause shock.

(11) Place the patient in basket, sitting with his hands clear of the sides, or in the litter, as described above. Signal the helicopter hoist operator when ready for the hoist. Patient should signal by a nodding of the head if he is able. Deck personnel give thumbs up.

(12) If it is necessary to take the litter away from the hoist point, unhook the hoist cable and keep it free for the helicopter to haul in. **Do not secure cable or trail line to the vessel or attempt to move stretcher without unhooking.**

(13) When patient is strapped into the stretcher, signal the helicopter to lower the cable, attach cable to stretcher sling (bridle), then signal the hoist operator when the patient is ready to hoist. Steady the stretcher so it will not swing or turn.

(14) If a trail line is attached to the basket or stretcher, use it to steady the patient as he is hoisted. Keep your feet clear of the line, and keep the line from becoming entangled.

Coast Guard droppable, floatable pumps.–The Coast Guard often provides vessels in distress with emergency pumps by either making parachute drops, by lowering on helicopter hoist, or by delivering by vessel. The most commonly used type of pump comes complete in a sealed aluminum drum about half the size of a 50-gallon oil drum. One single lever on top opens it up. Don't be smoking as there may be gas fumes inside the can. The pump will draw about 90 gallons per minute. There should be a waterproof flashlight on top of the pump for night use. Operating instructions are provided inside the pump container.

Preparations for being towed by Coast Guard:

(1) Clear the forecastle area as well as you can.

(2) If a line-throwing gun is used, keep everyone out of the way until line clears the boat. The Coast Guard vessel will blow a police whistle or otherwise warn you before firing.

(3) Have material ready for chafing gear.

Radar reflectors on small craft.–Operators of disabled wooden craft and persons adrift in rubber rafts or boats that are, or may consider themselves to be, the object of a search, should hoist on a halyard or otherwise place aloft as high as possible any metallic object that would assist their detection by radar. Coast Guard cutters and aircraft are radar equipped and thus are able to continue searching in darkness and during other periods of low visibility. It is advisable for coastal fishing boats, yachts, and other small craft to have efficient radar reflectors permanently installed aboard the vessel.

Filing Cruising schedules.–Small-craft operators should prepare a cruising plan before starting on extended trips and leave it ashore with a yacht club, marina, friend, or relative. It is advisable to use a checking-in procedure by telephone for each point specified in the cruising plan. Such a trip schedule is vital for determining if a boat is overdue and will assist materially in locating a missing craft in the event search and rescue operations become necessary.

Medical advice.–Free medical advice is furnished to seamen by radio through the cooperation of Governmental and commercial radio stations whose operators receive and relay messages from ships at sea to the U.S. Coast Guard and/or directly to a hospital and then radio the medical advice back to the ships. (See appendix for list of radio stations that provide this service.)

RADIO NAVIGATION WARNINGS AND WEATHER

Marine radio warnings and weather forecasts are disseminated by many sources and through several types of transmissions. Only voice radiotelephone broadcasts are described in the Coast Pilots. Radiotelegraph (CW), radioteletype, radiofacsimile, and CW broadcasts of navigational warnings and other advisories are not described, since these transmissions are normally copied only by professional radio operators. (For complete information on radio warnings and weather, see Pubs. 117A, 117B, and the Department of Commerce publication, Worldwide Marine Weather Broadcasts.)

Frequency units.–**Hertz (Hz)**, a unit equal to one cycle per second, has been generally adopted for radio frequencies; accordingly, frequencies formerly given in the Coast Pilots in kilocycles (kc) and megacycles (mc) are now stated in **kilohertz (kHz)** and **Megahertz (MHz)**, respectively.

Coast Guard radio stations.–Coast Guard radio stations provide urgent, safety, and scheduled marine information broadcasts with virtually complete coverage of the approaches and coastal waters of the United States, Puerto Rico, and the U.S. Virgin Islands.

Scheduled radiotelephone broadcasts include routine weather, small-craft advisories, storm warnings, navigation information, and other advisories on **2670 kHz** and/or a designated VHF-FM channel, following a preliminary call on **2182 kHz** and/or **VHF-FM channel 16 (156.80 MHz).** (See the appendix for a list of the stations and their broadcast frequencies and times for the area covered by this Coast Pilot.)

Urgent and safety radiotelephone broadcasts of important Notice to Mariners items, storm warnings, and other vital marine information are transmitted upon receipt, and urgent broadcasts are repeated 15 minutes later; additional broadcasts are made at the discretion of the originator. **Urgent** broadcasts are preceded by the urgent signal PAN (PAHN, spoken three times). **Both the urgent signal and message are transmitted on 2182 kHz and/or VHF-FM channel 16 (156.80 MHz). Safety** broadcasts are preceded by the safety signal SECURITY (SAY-CURITAY, spoken three times). **The safety signal is given on 2182 kHz and/or VHF-FM channel 16 (156.80 MHz), and the message is given on 2670 kHz and/or VHF-FM channel 22A (157.10 MHz).**

The National Weather Service operates **VHF-FM radio stations,** usually on frequencies **162.40, 162.475, or 162.55 MHz,** to provide continuous recorded weather broadcasts. These broadcasts are available to those with suitable receivers within about 40 miles of the antenna site. (See the appendix for a list of these stations in the area covered by this Coast Pilot.)

Commercial radiotelephone coast stations.–Broadcasts of coastal weather and warnings are made by some commercial radiotelephone coast stations (marine operators) on the normal transmitting frequencies of the stations. Vessels with suitable receivers and desiring this service may determine the frequencies and schedules of these broadcasts from their local stations or from Worldwide Marine Weather Broadcasts or from the series of Marine Weather Services Charts published by NWS.

Local broadcast-band radio stations.–Many local radio stations in the standard AM and FM broadcast band give local marine weather forecasts from NWS on a regular schedule. These stations are listed on the series of Marine Weather Services Charts published by NWS.

Reports from ships.–The master of every U.S. ship equipped with radio transmitting apparatus, on meeting with a tropical cyclone, dangerous ice, subfreezing air temperatures with gale force winds causing severe ice accretion on superstructures, derelict, or any other direct danger to navigation, is required to cause to be transmitted a report of these dangers to ships in the vicinity and to the appropriate Government agencies.

During the West Indies hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea area, southern North Atlantic Ocean, and the Pacific waters W of Central America and Mexico are urged to cooperate with NWS in furnishing these special reports in order that warnings to shipping and coastal areas may be issued.

Time Signals.–The **National Bureau of Standards** broadcasts time signals continuously, day and night, from its radio stations **WWV**, near Fort Collins, Colorado, (40°49′49″N., 105°02′27″W.) on frequencies of 2.5, 5, 10, 15, and 20 MHz, and **WWVH**, Kekaha, Kauai, Hawaii (21°59′26″N., 159°46′00″W.) on frequencies 2.5, 5, 10, and 15 MHz. Services include time announcements, standard time intervals, standard audio frequencies, Omega Navigation System status reports, geophysical alerts, high seas storm information, BCD (binary coded decimal) time code, and UT1 time corrections.

Time announcements are made every minute, commencing at 15 seconds before the minute by a female voice and at 7½ seconds before the minute by a male voice, from WWVH and WWV, respectively. The time given is in Coordinated Universal Time (UTC) and referred to the time at Greenwich, England, i.e., Greenwich Mean Time.

NBS Special Publication 432 gives a detailed description of the time and frequency dissemination services of the National Bureau of Standards. Single copies may be obtained upon request from the National Bureau of Standards, Boulder, Colorado 80302. Quantities may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NAUTICAL CHARTS

Reporting chart deficiencies.–Users are requested to report all significant observed discrepancies in and desirable additions to NOS nautical charts, including depth information in privately maintained channels and basins; obstructions, wrecks, and other dangers; new landmarks or the nonexistence or relocation of charted ones; uncharted fixed private aids to navigation; and deletions or additions of small-craft facilities. All such reports should be sent to The Director (OA/C322), National Ocean Survey, Rockville, Md. 20852.

Chart symbols and abbreviations.–The standard symbols and abbreviations approved for use on all regular nautical charts published by the Defense Mapping Agency Hydrographic/Topographic Center and NOS are contained in **Chart No. 1,** United States of America **Nautical Chart Symbols and Abbreviations.** This publication is available from the Defense Mapping Agency Office of Distribution Services and NOS, and their sales agents.

On certain foreign charts reproduced by the United States, and on foreign charts generally, the symbols and abbreviations used may differ from U.S. approved standards. It is, therefore, recommended that navigators who acquire and use foreign charts and reproductions procure the symbol sheet or Chart No. 1 produced by the same foreign agency.

The mariner is warned that the buoyage systems, shapes, and colors used by other countries often have a different significance than the U.S. system.

Chart Datum.–A **semidiurnal tide** has on the average two high waters (high tides) of nearly equal height and two low waters (low tides) of nearly equal height each tidal day (approximately 24.84 hours). A **mixed tide** is the same as the semidiurnal except that there is a significant difference between the heights of the two high waters and/or between the heights of the two low waters each tidal day. A **diurnal tide** has one high water and one low water each tidal day.

Prior to November 28, 1980, the following definitions were applicable: **Mean Low Water** was the arithmetic mean of the low water heights observed over a specific 19-year cycle (the National Tidal Datum Epoch). For a semidiurnal or a predominantly mixed tide, the two low waters of each tidal day were included in the mean. For a predominantly diurnal tide, the one low water of each tidal day was used in the mean. **Mean Lower Low Water** was the arithmetic mean of the lower low water (or only low water) heights of each tidal day of a predominantly mixed tide observed over a specific 19-year cycle. **Gulf Coast Low Water Datum** was Mean Low Water when the tide was classified diurnal and Mean Lower Low Water when the tide was classified mixed.

Chart Datum is the tidal datum for depths on NOS charts. It is Mean Low Water for the Atlantic coast of the United States, including the West Indies, and Mean Lower Low Water for the Pacific coast, including the Hawaiian Islands and Alaska. Through November 27, 1980, it was Gulf Coast Low Water Datum for the Gulf Coast including the Florida Keys.

Effective November 28, 1980, the tidal datum for soundings and isobaths on all Gulf Coast (including the Florida Keys) nautical charts became Mean Lower Low Water, defined as the average of the lower (or only low water) height of each tidal day observed over the National Tidal Datum Epoch (presently, the 19-year period, 1960 through 1978). Beginning in January 1983, datum statements (legends, labels, etc.) will be changed on all affected products (nautical charts, bathymetric maps, tide tables, etc.) of NOS with the next regularly scheduled editions of these products. Shoreline, depth sounding values, etc., will not be modified as a result of this change. As such, for navigational safety purposes, there will be a period of several years when the terms "Gulf Coast Low Water Datum" and "Mean Lower Low Water" are identical and interchangeable on NOS nautical charts and publications of the Gulf of Mexico coast.

Accuracy of a nautical chart.–The value of a nautical chart depends upon the accuracy of the surveys on which it is based. The chart reflects what was found by field surveys and what has been reported to NOS Headquarters. The chart represents general conditions at the time of surveys or reports and does not necessarily portray present conditions. Significant changes may have taken place since the date of the last survey or report.

Each sounding represents an actual measure of depth and location at the time the survey was made, and each bottom characteristic represents a sampling of the surface layer of the sea bottom at the time of sampling. Areas where sand and mud prevail, especially the entrances and approaches to bays and rivers exposed to strong tidal current and heavy seas, are subject to continual change.

In coral regions and where rocks and boulders abound, it is always possible that surveys may have failed to find every obstruction. Thus, when navigating such waters, customary routes and channels should be followed and areas avoided where irregular and sudden changes in depth indicate conditions associated with pinnacle rocks, coral heads, or boulders.

Information charted as "reported" should be treated with caution in navigating the area, because the actual conditions have not been verified by government surveys.

The **date of a chart** is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. Announcements of new editions of nautical charts are usually published in notices to mariners. A quarterly list of the latest editions is distributed to sales agents; free copies may be obtained from the sales agents or by writing to Distribution Division (OA/C44), National Ocean Survey, 6501 Lafayette Avenue, Riverdale, Md. 20737.

U.S. Nautical Chart Numbering System.-This chart numbering system, adopted by the National Ocean Survey and the Defense Mapping Agency Hydrographic/Topographic Center, provides for a uniform method of identifying charts published by both agencies. For charts published by NOS, a cross reference list (Nautical Chart Number Conversion Table) of new and old chart numbers can be obtained, without charge, from National Ocean Survey, Distribution Division (OA/C44), 6501 Lafayette Avenue, Riverdale, Md. 20737, or from any of its authorized sales agents. **The Coast Pilot reflects only the new chart numbers.** Use the new numbers when ordering charts. Nautical charts published by the Defense Mapping Agency Hydrographic/Topographic Center are identified in the Coast Pilot by an asterisk preceding the chart number.

Corrections to charts.-It is essential for navigators to keep charts corrected through information published in the notices to mariners, especially since the NOS no longer hand-corrects charts prior to distribution.

Caution in using small-scale charts.-Dangers to navigation cannot be shown with the same amount of detail on small-scale charts as on those of larger scale. Therefore, the largest scale chart of an area should always be used.

The **scales of nautical charts** range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scales of 1:80,000 or larger, and numerical scales are given on smaller scale charts. NOS charts are classified according to scale as follows:

Sailing charts, scales 1:600,000 and smaller, are for use in fixing the mariner's position as he approaches the coast from the open ocean, or for sailing between distant coastwise ports. On such charts the shoreline and topography are generalized and only offshore soundings, and the principal lights, outer buoys, and landmarks visible at considerable distances are shown.

General charts, scales 1:150,000 to 1:600,000, are for coastwise navigation outside of outlying reefs and shoals.

Coast charts, scales 1:50,000 to 1:150,000 are for inshore navigation leading to bays and harbors of considerable width and for navigating large inland waterways.

Harbor charts, scales larger than 1:50,000, are for harbors, anchorage areas, and the smaller waterways.

Special charts, various scales, cover the Intracoastal waterways and miscellaneous small-craft areas.

Blue tint in water areas.-A blue tint is shown in water areas on many charts to accentuate shoals and other areas considered dangerous for navigation when using that particular chart. Since the danger curve varies with the intended purpose of a chart a careful inspection should be made to determine the contour depth of the blue tint areas.

Caution on bridge and cable clearances.-For bascule bridges whose spans do not open to a full vertical position, unlimited overhead clearance is not available for the entire charted horizontal clearance when the bridge is open, due to the inclination of the drawspans over the channel.

The charted clearances of overhead cables are for the lowest wires at normal high water unless otherwise stated. **Vessels with masts, stacks, booms, or antennas should allow sufficient clearance under power cables to avoid arcing.**

Submarine cables and pipelines cross many waterways used by both large and small vessels, but all of them may not be charted. For inshore areas, they usually are buried beneath the seabed, but, for offshore areas, they may lie on the ocean floor. Warning signs are often posted to warn mariners of their existence.

The installation of submarine cables or pipelines in U.S. waters or the Continental Shelf of the United States is under the jurisdiction of one or more Federal agencies, depending on the nature of the installation. They are shown on the charts when the necessary information is reported to NOS and they have been recommended for charting by the cognizant agency. The chart symbols for submarine cable and pipeline areas are usually shown for inshore areas, whereas, chart symbols for submarine cable and pipeline routes may be shown for offshore areas. Submarine cables and pipelines are not described in the Coast Pilots.

In view of the serious consequences resulting from damage to submarine cables and pipelines, vessel operators should take special care when anchoring, fishing, or engaging in underwater operations near areas where these cables or pipelines may exist or have been reported to exist.

Certain cables carry high voltage, while many pipelines carry natural gas under high pressure or petroleum products. Electrocution, fire, or explosion with injury, loss of life, or a serious pollution incident could occur if they are broached.

Vessels fouling a submarine cable or pipeline should attempt to clear without undue strain. Anchors or gear that cannot be cleared should be slipped, but no attempt should be made to cut a cable or pipeline.

Artificial obstructions to navigation.–Disposal areas are designated by the Corps of Engineers for depositing dredged material where existing depths indicate that the intent is not to cause sufficient shoaling to create a danger to surface navigation. The areas are charted without blue tint, and soundings and depth curves are retained.

Dump Sites are areas established by Federal regulation (40 CFR 220–229) in which dumping of dredged and fill material and other nonbuoyant objects is allowed with the issuance of a permit. Dumping of dredged and fill material is supervised by the Corps of Engineers and all other dumping by the Environmental Protection Agency (EPA). (See Corps of Engineers and Environmental Protection Agency, this chapter, and appendix for office addresses.)

Dumping Grounds are also areas that were established by Federal regulation (33 CFR 205). However, these regulations have been revoked and the use of the areas discontinued. These areas will continue to be shown on nautical charts until such time as they are no longer considered to be a danger to navigation.

Dump Sites and Dumping Grounds are rarely mentioned in the Coast Pilot, but are shown on nautical charts. **Mariners are advised to exercise extreme caution in and in the vicinity of all dumping areas.**

Spoil areas are for the purpose of depositing dredged material, usually near and parallel to dredged channels; they are usually a hazard to navigation. Spoil areas are usually charted from survey drawings from Corps of Engineers after-dredging surveys, though they may originate from private or other Government agency surveys. Spoil areas are tinted blue on the chart and labeled, and all soundings and depth curves are omitted. Navigators of even the smallest craft should avoid crossing spoil areas.

Fish havens are established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk ranging from old trolley cars and barges to scrap building material in areas which may be of very small extent or may stretch a considerable distance along a depth curve; old automobile bodies are a commonly used material. The Corps of Engineers must issue a permit, specifying the location and depth over the reef, before such a reef may be built. However, the reefbuilders' adherence to permit specifications can be checked only with a wire drag. Fish havens are outlined and labeled on the charts and show the minimum authorized depth when known. Fish havens are tinted blue if they have a minimum authorized depth of 11 fathoms or less or if the minimum authorized depth is unknown and they are in depths greater than 11 fathoms but still considered a danger to navigation. Navigators should be cautious about passing over fish havens or anchoring in their vicinity.

Fishtrap areas are areas established by the Corps of Engineers, or State or local authority, in which traps may be built and maintained according to established regulations. The areas and regulations are in 33 CFR 206. (They are not carried in this Pilot.) The fish stakes which may exist in these areas are obstructions to navigation and may be dangerous. The limits of fishtrap areas and a cautionary note are usually charted. Navigators should avoid these areas.

Local magnetic disturbances.–If measured values of magnetic variation differ from the expected (charted) values by several degrees, a magnetic disturbance note will be printed on the chart. The note will indicate the location and magnitude of the disturbance, but the indicated magnitude should not be considered as the largest possible value that may be encountered. Large disturbances are more frequently detected in the shallow waters near land masses than on the deep sea. Generally, the effect of a local magnetic disturbance diminishes rapidly with distance, but in some locations there are multiple sources of disturbances and the effects may be distributed for many miles.

Compass roses on charts.–Each compass rose shows the date, magnetic variation, and the annual change in variation. Prior to the new edition of a nautical chart, the compass roses are reviewed. Corrections for annual change and other revisions may be made as a result of newer and more accurate information. On some general and sailing charts, the magnetic variation is shown by isogonic lines in addition to the compass roses.

The **Mercator projection** used on most nautical charts has straight-line meridians and parallels that intersect at right angles. On any particular chart the distances between meridians are equal throughout, but distances between parallels increase progressively from the Equator toward the poles, so that a straight line between any two points is a rhumb line. This unique property of the Mercator projection is one of the main reasons why it is preferred by the mariner.

Echo soundings.–Ship's echo sounders may indicate small variations from charted soundings; this may be due to the fact that various corrections (instrument corrections, settlement and squat, draft, and velocity corrections) are made to echo soundings in surveying which are not normally made in ordinary navigation, or to observational errors in reading the echo sounder. Instrument errors vary between different equipment and must be determined by calibration aboard ship. Most types of echo sounders are factory calibrated for a velocity of sound in water of 800 fathoms per second, but the actual velocity may differ from the calibrated velocity by as much as 5 percent, depending upon the temperature and salinity of the waters in which the vessel is operating; the highest velocities are found in warm, highly saline water, and the lowest in icy freshwater. Velocity corrections for these variations are determined and applied to echo soundings during hydrographic surveys. All echo soundings must be corrected for the vessel's draft, unless the draft correction has been set on the echo sounder.

Observational errors include misinterpreting false echos from schools of fish, seaweed, etc., but the most serious error which commonly occurs is where the depth is greater than the scale range of the instrument; a 400-fathom scale indicates 15 fathoms when the depth is 415 fathoms. Caution in navigation should be exercised when wide variations from charted depths are observed.

AIDS TO NAVIGATION

Reporting of defects in aids to navigation.–Promptly notify the nearest Coast Guard District Commander if an aid to navigation is observed to be missing, sunk, capsized, out of position, damaged, extinguished, or showing improper characteristics.

Radio messages should be prefixed "Coast Guard" and transmitted directly to any U.S. Government shore radio station for relay to the Coast Guard District Commander. If the radio call sign of the nearest U.S. Government radio shore station is not known, radiotelegraph communication may be established by the use of the general call "NCG" on the frequency of 500 kHz. Merchant ships may send messages relating to defects noted in aids to navigation through commercial facilities only when they are unable to contact a U.S. Government shore radio station. Charges for these messages will be accepted "collect" by the Coast Guard.

Lights.–The range of visibility of lights as given in the Light Lists and as shown on the charts is the **Nominal range,** which is the maximum distance at which a light may be seen in clear weather (meteorological visibility of 10 nautical miles) expressed in nautical miles. The Light Lists give the Nominal ranges for all Coast Guard lighted aids except range and directional lights. **Luminous range** is the maximum distance at which a light may be seen under the existing visibility conditions. By use of the diagram in the Light Lists, Luminous range may be determined from the known Nominal range, and the existing visibility conditions. Both the Nominal and Luminous ranges do not take into account elevation, observer's height of eye, or the curvature of the earth. **Geographic range** is a function of only the curvature of the earth and is determined solely from the heights above sea level of the light and the observer's eye; therefore, to determine the actual Geographic range for a height of eye, the Geographic range must be corrected by a distance corresponding to the height difference, the distance correction being determined from a table of "distances of visibility for various heights above sea level." (See Light List or Coast Pilot table following appendix.) The maximum distances at which lights can be seen may at times be increased by abnormal atmospheric refraction and may be greatly decreased by unfavorable weather conditions, such as fog, rain, haze, or smoke. All except the most powerful lights are easily obscured by such conditions. In some conditions of the atmosphere white lights may have a reddish hue. During weather conditions which tend to reduce visibility, colored lights are more quickly lost to sight than are white lights. Navigational lights should be used with caution because of the following conditions that may exist:

A light may be extinguished and the fact not reported to the Coast Guard for correction, or a light may be located in an isolated area where it will take time to correct.

In regions where ice conditions prevail the lantern panes of unattended lights may become covered with ice or snow, which will greatly reduce the visibility and may also cause colored lights to appear white.

Brilliant shore lights used for advertising and other purposes, particularly those in densely populated areas, make it difficult to identify a navigational light.

At short distances flashing lights may show a faint continuous light between flashes.

The distance of an observer from a light cannot be estimated by its apparent intensity. The characteristics of lights in an area should always be checked in order that powerful lights visible in the distance will not be mistaken for nearby lights showing similar characteristics at low intensity such as those on lighted buoys.

The apparent characteristic of a complex light may change with the distance of the observer, due to color and intensity variations among the different lights of the group. The characteristic as charted and shown in the Light List may not be recognized until nearer the light.

Motion of a vessel in a heavy sea may cause a light to alternately appear and disappear, and thus give a false characteristic.

Where lights have different colored sectors, be guided by the correct bearing of the light; do not rely on being able to accurately observe the point at which the color changes. On either side of the line of demarcation of colored sectors there is always a small arc of uncertain color.

On some bearings from the light, the range of visibility of the light may be reduced by obstructions. In such cases, the obstructed arc might differ with height of eye and distance. When a light is cut off by adjoining land and the arc of visibility is given, the bearing on which the light disappears may vary with the distance of the vessel from which observed and with the height of eye. When the light is cut off by a sloping hill or point of land, the light may be seen over a wider arc by a ship far off than by one close to.

Arcs of circles drawn on charts around a light are not intended to give information as to the distance at which it can be seen, but solely to indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation of visibility or obscuration of the light occurs.

Lights of equal candlepower but of different colors may be seen at different distances. This fact should be considered not only in predicting the distance at which a light can be seen, but also in identifying it.

Lights should not be passed close aboard, because in many cases riprap mounds are maintained to protect the structure against ice damage and scouring action.

Many prominent towers, tanks, smokestacks, buildings, and other similar structures, charted as landmarks, display flashing and/or fixed red aircraft obstruction lights. Lights shown from landmarks are charted only when they have distinctive characteristics to enable the mariner to positively identify the location of the charted structure.

Bridge lights and clearance gages.–The Coast Guard regulates marine obstruction lights and clearance gages on bridges across navigable waters. Where installed, clearance gages are generally vertical numerical scales, reading from top to bottom, and show the actual vertical clearance between the existing water level and the lowest point of the bridge over the channel; the gages are normally on the right-hand pier or abutment of the bridge, on both the upstream and downstream sides.

Bridge lights are fixed red or green, and are privately maintained; they are generally not charted or described in the text of the Coast Pilots. All bridge piers (and their protective fenders) and abutments which are in or adjacent to a navigation channel are marked on all channel sides by red lights. On each channel span of a fixed bridge, there is a range of two green lights marking the center of the channel and a red light marking both edges of the channel, except that when the margins of the channel are confined by bridge piers, the red lights on the span are omitted, since the pier lights then mark the channel edges; for multiplespan fixed bridges, the main-channel span may also be marked by three white lights in a vertical line above the green range lights.

On all types of drawbridges, one or more red lights are shown from the drawspan (higher than the pier lights) when the span is closed; when the span is open, the higher red lights are obscured and one or two green lights are shown from the drawspan, higher than the pier lights. The number and location of the red and green lights depend upon the type of drawbridge.

Bridges and their lighting, construction, maintenance, and operation are set forth in 33 CFR 114–118. Aircraft obstruction lights, prescribed by the Federal Aviation Administration, may operate at certain bridges. Drawbridge operation regulations are published in chapter 2 of the Coast Pilots.

Fog signals.–Caution should be exercised in the use of sound fog signals for navigation purposes. They should be considered solely as warning devices.

Sound travels through the air in a variable manner, even without the effects of wind, therefore, the hearing of fog signals cannot be implicitly relied upon.

Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a fog signal in which it is not heard; and that fog may exist not far from a station, yet not be seen from it, so the signal may not be operating. It is not always possible to start a fog signal immediately when fog is observed.

Avoidance of collision with lightships, ocean station vessels, offshore light stations, and large navigational buoys (LNB).–Courses should invariably be set to pass these aids with sufficient clearance to avoid the possibility of collision from any cause. Errors of observation, current and wind effects, other vessels in the vicinity, and defects in steering gear may be and have been the cause of actual collisions, or imminent danger thereof, needlessly jeopardizing the safety of these facilities and their crews, and of all navigation dependent on these important aids to navigation.

Experience shows that lightships and offshore light stations cannot be safely used as leading marks to be passed close aboard, but should always be left broad off the course, whenever sea room permits. When approaching lightships, ocean station vessels, fixed offshore light structures, and large navigational buoys (LNB) on radio bearings, the risk of collision will be avoided by ensuring that radio bearing does not remain constant.

It should be borne in mind that most lightships and large buoys are anchored to a very long scope of chain and, as a result, the radius of their swinging circle is considerable. The charted position is the location of the anchor. Furthermore under certain conditions of wind and current, they are subject to sudden and unexpected sheers which are certain to hazard a vessel attempting to pass close aboard.

During extremely heavy weather and due to their exposed locations, lightships may be carried off station without the knowledge and despite the best efforts of their crews. The mariner should, therefore, not implicitly rely on a lightship maintaining its precisely charted position during and immediately following severe storms. A lightship known to be off station will secure her light, fog signal, and radiobeacon and fly the International

Code signal "LO" signifying "I am not in my correct position".

Watch (station) buoys are sometimes moored near lightships and seacoast buoys to mark the approximate station should these important aids be carried away or temporarily removed. The lightship watch buoy also gives the crew an indication of dragging.

Since these uncharted buoys are always unlighted and, in some cases, moored as much as a mile from the lightship or seacoast buoy, the danger of a closely passing vessel colliding with them is always present–particularly so during darkness or periods of reduced visibility.

Buoys.–The aids to navigation depicted on charts comprise a system consisting of fixed and floating aids with varying degrees of reliability. Therefore, prudent mariners will not rely solely on any single aid to navigation, particularly a floating aid.

The approximate position of a buoy is represented by the dot or circle associated with the buoy symbol. The approximate position is used because of practical limitations in positioning and maintaining buoys and their sinkers in precise geographical locations. These limitations include, but are not limited to, inherent imprecisions in position fixing methods, prevailing atmospheric and sea conditions, the slope of and the material making up the seabed, the fact that buoys are moored to sinkers by varying lengths of chain, and the fact that buoy body and/or sinker positions are not under continuous surveillance, but are normally checked only during the periodic maintenance visits which often occur more than a year apart. The position of the buoy body can be expected to shift inside and outside of the charting symbol due to the forces of nature. The mariner is also cautioned that buoys are liable to be carried away, shifted, capsized, sunk, etc. Lighted buoys may be extinguished or sound signals may not function as a result of ice, running ice or other natural causes, collisions, or other accidents.

For the foregoing reasons, a prudent mariner must not rely completely upon the charted position or operation of floating aids to navigation, but will also utilize bearings from fixed objects and aids to navigation on shore. Further, a vessel attempting to pass close aboard always risks collision with a yawing buoy or with the obstruction the buoys marks.

Buoys may not always properly mark shoals or other obstructions due to shifting of the shoals or of the buoys. Buoys marking wrecks or other obstructions are usually placed on the seaward or channelward side and not directly over a wreck. Since buoys may be located some distance from a wreck they are intended to mark, and since sunken wrecks are not always static, extreme caution should be exercised when operating in the vicinty of such buoys.

Caution, channel markers.–Lights, daybeacons, and buoys along dredged channels do not always mark the bottom edges. Due to local conditions, aids may be located inside or outside the channel limits shown by dashed lines on a chart. The Light List tabulates the offset distances for these aids in many instances.

Aids may be moved, discontinued, or replaced by other types to facilitate dredging operations. Mariners should exercise caution when navigating areas where dredges with auxiliary equipment are working.

Temporary changes in aids are not included on the charts.

Radiobeacons.–A map showing the locations and operating details of marine radiobeacons is given in each Light List. This publication describes the procedure to follow in using radiobeacons to calibrate radio direction finders as well as listing special radio direction-finder calibration stations.

A vessel steering a course for a radiobeacon should observe the same precautions as when steering for a light or any other mark. If the radiobeacon is aboard a lightship, particular care should be exercised to avoid the possibility of collision, and sole reliance should never be placed on sighting the lightship or hearing its fog signal. If there are no dependable means by which the vessel's position may be fixed and the course changed well before reaching the lightship, a course should be selected that will ensure passing the lightship at a distance, rather than close aboard, and repeated bearings of the radiobeacon should show an increasing change in the same direction.

Radio bearings.–No exact data can be given as to the accuracy to be expected in radio bearings taken by a ship, since the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment, and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information for themselves by taking frequent radio bearings, when their ship's position is accurately known, and recording the results.

Radio bearings obtained at twilight or at night, and bearings which are almost parallel to the coast, should be accepted with reservations, due to "night effect" and to the distortion of radio waves which travel overland. Bearings of aircraft ranges and standard broadcast stations should be used with particular caution due to coastal refraction and lack of calibration of their frequencies.

Conversion of radio bearings to Mercator bearings.–Radio directional bearings are the bearings of the great circles passing through the radio stations and the ship, and, unless in the plane of the Equator or a meridian, would be represented on a Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on a Mercator chart, so it is necessary to apply a correction to a radio bearing to convert it into a Mercator bearing, that is, the bearing of a straight line on a Mercator chart laid off from the sending station and passing through the receiving station.

A table of corrections for the conversion of a radio bearing into a Mercator bearing follows the appendix. It is sufficiently accurate for practical purposes for distances up to 1,000 miles.

The only data required are the latitudes and longitudes of the radiobeacons and of the ship by dead reckoning. The latter is scaled from the chart, and the former is either scaled from the chart or taken from the Light List.

The table is entered with the differences of longitude in degrees between the ship and station (the nearest tabulated value being used), and opposite the middle latitude between the ship and station, the correction to be applied is read.

The sign of the correction (bearings read clockwise from N) will be as follows: In north latitude, the minus sign is used when the ship is E of the radiobeacon and the plus sign used when the ship is W of the radiobeacon. In south latitude, the plus sign is used when the ship is E of the radiobeacon, and the minus sign is used when the ship is W of the radiobeacon.

To facilitate plotting, 180 degrees should be added to or subtracted from the corrected bearing, and the result plotted from the radiobeacon.

Should the position by dead reckoning differ greatly from the true position of the ship as determined by plotting the corrected bearings, retrial should be made, using the new value as the position of the ship.

Radio bearings from other vessels.–Any vessel with a radio direction-finder can take a bearing on a vessel equipped with a radio transmitter. These bearings, however, should be used only as a check, as comparatively large errors may be introduced by local conditions surrounding the radio direction-finder unless known and accounted for. Although any radio station, for which an accurate position is defintely known, may serve as a radiobeacon for vessels equipped with a radio direction-finder, extreme caution must be exercised in their use. Stations established especially for maritime services are more reliable.

Radar transponder beacons (Racons) are low-powered radio transceivers that operate in the marine radar X-band frequencies. When activated by a vessel's radar signal, Racons provide a distinctive visible display on the vessel's radarscope from which the range and bearing to the beacon may be determined. (See Light List and DMAHTC Pub. 117B for details.)

Loran.–A list of stations and descriptive details of the Loran System are given in the Light Lists. Instructions, tables, and charts of the Loran System are published by the Defense Mapping Agency Hydrographic/Topographic Center. NOS shows loran lines on sailing, general, and coastal charts of the U.S. coasts.

Exact data cannot be given as to the accuracy to be expected in loran positions since the accuracy depends to a large extent on the skill of the operator, the condition and type of receiving equipment, and the area of operation. The accuracy of a loran fix is determined by the accuracy of the individual lines of positions used to establish the fix and by their angle of intersection.

Loran position determinations on or near the baseline extensions are subject to significant geometric errors and, therefore, should be avoided whenever possible. Loran is a long-range aid to navigation and should not normally be used in pilot waters. The use of skywaves is not recommended within 250 miles of either station.

Caution must be used in matching loran signals to ensure that the groundwave signal of the master station is not unknowingly matched with a skywave signal of a secondary station, or vice versa; or that a one-hop skywave signal from one station is not matched with a two-hop skywave signal from the other.

Omega.–Omega is a continuous radionavigation system which provides hyperbolic lines of position through phase comparisons of very low frequency (10–14 kHz range) continuous wave signals transmitted on a common frequency on a time shared basis. With eight transmitting stations located throughout the world, Omega provides worldwide, all weather navigation coverage. Six stations make Omega available in nearly all parts of the globe, with the two other stations providing redundancy and coverage during off-air time for maintenance.

Users are cautioned that the Omega system is in an implementation stage. System changes and station off-air periods are promulgated by Notice to Mariners and radio navigational warning messages. Current information on the status of individual Omega transmitting stations is broadcast on station WWV, 16 minutes after the hour, and on station WWVH, 47 minutes after the hour. Current status reports are available by telephone (202–245–0298).

At the present time, the worldwide accuracy and reliability of this system cannot be precisely determined. Therefore, positioning information derived from Omega should not be totally relied upon without reference to other positioning methods.

Uniform State Waterway Marking System.–Many bodies of water used by boatmen are located entirely within the boundaries of a State. The Uniform State Waterway Marking System (USWMS) has been developed to indicate to the small-boat operator hazards, obstructions, restricted or controlled areas, and to provide directions. Although intended primarily for waters within the State boundaries, USWMS is suited for use in all water areas, since it supplements and is generally compatible with the Coast Guard lateral system of aids to navigation. The Coast Guard is gradually using more aids bearing the USWMS geometric shapes described below.

Two categories of waterway markers are used. Regulatory markers, buoys, and signs use distinctive standard shape marks to show regulatory information. The signs are white with black letters and have a wide orange border. They signify speed zones, restricted areas, danger areas, and directions to various places. Aids to navigation on State waters use red and black buoys to mark channel limits. Red and black buoys are generally used in pairs. The boat should pass between the red buoy and its companion black buoy. If the buoys are not placed in pairs, the distinctive color of the buoy indicates the direction of dangerous water from the buoy. White buoys with red tops should be passed to the S or W, indicating that danger lies to the N or E of the buoy. White buoys with black tops should be passed to the N or E. Danger lies to the S or W. Vertical red and white striped buoys indicate a boat should not pass between the buoy and the nearest shore. Danger lies inshore of the buoy.

DESTRUCTIVE WAVES.–Unusual sudden changes in water level can be caused by tsunamis or violent storms. These two types of destructive waves have become commonly known as **tidal waves,** a name which is technically incorrect as they are not the result of tide-producing forces.

Tsunamis (seismic sea waves) are set up by submarine earthquakes. Many such seismic disturbances do not produce sea waves and often those produced are small, but the occasional large waves can be very damaging to shore installations and dangerous to ships in harbors.

These waves travel great distances and can cause tremendous damage on coasts far from their source. The wave of April 1, 1946, which originated in the Aleutian Trench, demolished nearby Scotch Cap Lighthouse and caused damages of $25 million in the Hawaiian Islands 2,000 miles away. The wave of May 22-23, 1960, which originated off southern Chile, caused widespread death and destruction in islands and countries throughout the Pacific.

The speed of tsunamis varies with the depth of the water, reaching 300 to 500 knots in the deep water of the open ocean. In the open sea they cannot be detected from a ship or from the air because their length is so great, sometimes a hundred miles, as compared to their height, which is usually only a few feet. Only on certain types of shelving coasts do they build up into waves of disastrous proportions.

There is usually a series of waves with crests 10 to 40 minutes apart, and the highest may occur several hours after the first wave. Sometimes the first noticeable part of the wave is the trough which causes a recession of the water from shore, and people who have gone out to investigate this unusual exposure of the beach have been engulfed by the oncoming crest. Such an unexplained withdrawal of the sea should be considered as nature's warning of an approaching wave.

Improvements have been made in the quick determination and reporting of earthquake epicenters, but no method has yet been perfected for determining whether a sea wave will result from a given earthquake. The Pacific Tsunami Warning Center, Oahu, Hawaii, of the National Oceanic and Atmospheric Administration is headquarters of a warning system which has field reporting stations (seismic and tidal) in most countries around the Pacific. When a warning is broadcast, waterfront areas should be vacated for higher ground, and ships in the vicinity of land should head for the deep water of the open sea.

Storm surge.–A considerable rise or fall in the level of the sea along a particular coast may result from strong winds and sharp change in barometric pressure. In cases where the water level is raised, higher waves can form with greater depth and the combination can be destructive to low regions, particularly at high stages of tide. Extreme low levels can result in depths which are considerably less than those shown on nautical charts. This type of wave occurs especially in coastal regions bordering on shallow waters which are subject to tropical storms.

Seiche is a stationary vertical wave oscillation with a period varying from a few minutes to an hour or more, but somewhat less than the tidal periods. It is usually attributed to external forces such as strong winds, changes in barometric pressure, swells, or tsunamis disturbing the equilibrium of the water surface. Seiche is found both in enclosed bodies of water and superimposed upon the tides of the open ocean. When the external forces cause a short-period horizontal oscillation of the water, it is called **surge.**

The combined effect of seiche and surge sometimes makes it difficult to maintain a ship in its position alongside a pier even though the water may appear to be completely undisturbed, and heavy mooring lines have been parted repeatedly under such conditions. Pilots advise taut lines to reduce the effect of the surge.

SPECIAL SIGNALS FOR CERTAIN VESSELS

Special signals for surveying vessels.–National Ocean Survey vessels while engaged in hydrographic surveying are required by Navigation Rules, International-Inland, Rule 27, to exhibit:

(b)(i) three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white;

(ii) three shapes in a vertical line where they can best be seen. The highest and lowest of these shapes shall be balls and the middle one a diamond;

(iii) when making way through the water, masthead lights, sidelights and a sternlight, in addition to the lights prescribed in subparagraph (b)(i); and

(iv) when at anchor, in addition to the lights or shapes prescribed in subparagraphs (b)(i) and (ii) the light, lights or shapes prescribed in Rule 30, Anchored Vessels and Vessels Aground.

The color of the above shapes is black.

The **wire drags** used by the NOS in sweeping for dangers to navigation may be crossed by vessels without danger of fouling at any point except between the towing launches and the large buoys near them, where the towline approaches the surface of the water. Vessels passing over the drag are requested to change course so as to cross it approximately at right angles, as a diagonal course may cause the propeller to foul the supporting buoys and attached wires. No attempt should be made to pass between the drag launches while the wire is being set out or taken in, unless it would endanger a vessel to do otherwise, because the bottom wire is slack and the floats at each 100-foot section may lift it nearly to the surface; at this time the launches usually are headed directly toward or away from each other and the operation may be clearly seen.

Warning signals for Coast Guard vessels while handling or servicing aids to navigation are the same as those prescribed for surveying vessels. (See Special Signals for Surveying Vessels, this chapter.)

Minesweeper signals.–U.S. vessels engaged in minesweeping operations or exercises are hampered to a considerable extent in their maneuvering powers. With a view to indicating the nature of the work on which they are engaged, these vessels will show the signals hereinafter mentioned. For the public safety, all other vessels, whether steamers or sailing craft, must endeavor to keep out of the way of vessels displaying these signals and not approach them inside the distances mentioned herein, especially remembering that it is dangerous to pass between the vessels of a pair or group sweeping together.

All vessels towing sweeps are to show: **By day,** a black ball at or near the foremast head and a black ball at each end of the fore yard. **By night,** all around green lights instead of the black balls, and in a similar manner.

Vessels or formations showing these signals are not to be approached nearer than 1,640 feet (500 meters) on either beam and vessels are not to cross astern closer than 3,280 feet (1,000 meters). Under no circumstances is a vessel to pass through a formation of minesweepers. Minesweepers should be prepared to warn merchant vessels which persist in approaching too close by means of any of the appropriate signals from the International Code of Signals. In fog, mist, falling snow, heavy rainstorms, or any other condition similarily restricting visibility, whether by day or night, minesweepers while towing sweeps when in the vicinity of other vessels will sound whistle signals for a vessel towing (one prolonged blast followed by two short blasts).

The United States is increasingly using helicopters to conduct minesweeping operations and exercises. When so engaged, helicopters, like vessels, are considerably hampered in their ability to maneuver. Helicopters may function at night as well as during the day and in varying types of weather. Accordingly, surface vessels approaching helicopters engaged in minesweeping operations should take precautions similar to those described above with regard to minesweeping vessels.

Helicopters towing minesweeping gear, and surface escorts, if any, will use all practical means to warn approaching ships of the operations being conducted. Where practical, measures will be taken to mark or light the gear being towed. While towing, the helicopter's altitude varies from 49.2 to 311.6 feet (15 to 95 meters) above the water, and speeds vary from 0 to 30 knots.

Minesweeping helicopters are equipped with a rotating beacon which has a selectable red and amber mode. The amber mode is used during towing operations to notify and warn other vessels that the helicopter is towing.

Submarine emergency identification signals.–U.S. submarines are equipped with signal ejectors which may be used to launch identification signals, including emergency signals. Two general types of signals may be used: smoke floats and flares or stars. The smoke floats, which burn on the surface, produce a dense colored smoke for a period of 15 to 45 seconds. The flares or stars are propelled to a height of 300 to 400 feet from which they descend by small parachute. The flares or stars burn for about 25 seconds. The color of the smoke or flare/star has the following meaning:

Green or black is used under training exercise conditions only to indicate that a torpedo has been fired or that the firing of a torpedo has been simulated.

Yellow indicates the submarine is about to rise to periscope depth. Surface craft terminate antisubmarine counterattack and clear vicinity of submarine. Do not stop propellers.

Red indicates an emergency inside the submarine; she will try to surface immediately. Surface ships clear the area and stand by to assist. In case of repeated red signals, or if the submarine fails to surface in a reasonable time, she may be presumed disabled. Buoy the location, look for submarine buoy, and attempt to establish sonar communications. Advise U.S. Navy authorities immediately.

Submarine marker buoys consist of two spheres 3 feet in diameter with connecting structure, painted international orange. The buoy has a wire cable to the submarine, to act as a downhaul line for a rescue chamber. The buoy may be accompanied by an oil slick release to attract attention. A submarine on the bottom in distress may release this buoy. If sighted, such a buoy should be investigated and reported immediately to U.S. Navy authorities.

The submarine may transmit the International Distress Signal (SOS) on its sonar gear independently or in conjunction to the red signal. Submarines also may use these other means of attracting attention: release of dye marker or air bubble; ejection of oil; pounding on hull.

Vessels Constrained by their Draft.–International Navigation Rules, Rule 28, states that a vessel constrained by her draft may, in addition to the lights prescribed for power-driven vessels in Rule 23, exhibit where they can best be seen three all-round red lights in a vertical line, or a cylinder.

NAVIGATION RESTRICTIONS AND REQUIREMENTS

Traffic Separation Schemes (Traffic Lanes).–To increase the safety of navigation, particularly in areas of high shipping density, routes incorporating traffic separation have, with the approval of the Inter-Governmental Maritime Consultative Organization (IMCO), been established in certain areas of the world. In the interest of safe navigation, it is recommended that through traffic use these schemes, as far as circumstances permit, by day and by night and in all weather conditions. The schemes which are intended for use by all vessels do not give any special rights to vessels using them.

General principles for navigation in Traffic Separation Schemes are as follows:

1. The International Regulations for Preventing Collisions at Sea and the Inland Rules of the Road, as appropriate, apply to navigation in traffic separation schemes.

2. Traffic separation schemes are intended for use by day and by night in all weather, in ice-free waters or under light ice conditions where no extraordinary maneuvers or assistance by icebreaker(s) are required.

3. Traffic separation schemes are recommended for use by all ships unless stated otherwise. Bearing in mind the need for adequate underkeel clearance, a decision to use a traffic separation scheme must take into account the charted depth, the possibility of changes in the sea-bed since the time of last survey, and the effects of meteorological and tidal conditions on water depths.

4. A deepwater route is primarily intended for use by ships which because of their draft in relation to the available depth of water in the area concerned require the use of such a route. Through traffic to which the above consideration does not apply should, if practicable, avoid following deepwater routes. When using a deepwater route mariners should be aware of possible changes in the indicated depth of water due to meteorological or other effects.

5. Users of traffic separation schemes adopted by IMCO will be guided by Rule 10 of the 1972 International Regulations for Preventing Collisions at Sea (72 COLREGS) as follows:

(a) This Rule applies to traffic separation schemes adopted by the Organization.

(b) A vessel using a traffic separation scheme shall:

(i) proceed in the appropriate traffic lane in the general direction of traffic flow for that lane;

(ii) so far as practicable keep clear of a traffic separation line or separation zone;

(iii) normally join or leave a traffic separation lane at the termination of the lane, but when joining or leaving from the side shall do so at as small an angle to the general direction of traffic flow as practicable.

(c) A vessel shall so far as practicable avoid crossing traffic lanes, but if obliged to do so, shall cross as nearly as practicable at right angles to the general direction of traffic flow.

(d) Inshore traffic zones shall not normally be used by through traffic which can safely use the appropriate traffic lane within the adjacent traffic separation scheme.

(e) A vessel, other than a crossing vessel, shall not normally enter a separation zone or cross a separation line except:

(i) in cases of emergency to avoid immediate danger;

(ii) to engage in fishing within a separation zone.

(f) A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution.

(g) A vessel shall so far as practicable avoid anchoring in a traffic separation scheme or in areas near its terminations.

(h) A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.

(i) A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.

(j) A vessel of less than 20 meters in length or a sailing vessel shall not impede the safe passage of a powerdriven vessel following a traffic lane.

6. The arrows printed on charts merely indicate the general direction of traffic; ships need not set their courses strictly along the arrows.

7. The signal "YG" meaning "You appear not to be complying with the traffic separation scheme" is provided in the International Code of Signals for appropriate use.

When approved or established, traffic separation scheme details are announced in Notice to Mariners, and later depicted on appropriate charts and included in Coast Pilots and Sailing Directions.

Oil Pollution.-The Oil Pollution Act, 1961, as amended, provides for **prohibited zones** throughout the world within which the discharge of oil or any oily mixture is unlawful. The prohibited zones for the United States, Puerto Rico, the U.S. Virgin Islands, and adjacent foreign territory include sea areas within 50 miles from the nearest land and the following sea areas extending more than 50 miles from the nearest land: North-West Atlantic Zone, comprising the sea areas within a line drawn from 38°47′N., 73°43′ W., to 39°58′N., 68°34′W., thence to 42°05′N., 64°37′W., thence along the east coast of Canada at a distance of 100 miles from the nearest land. Canadian Western Zone (Pacific Ocean), extending for a distance of 100 miles from the nearest land along the west coast of Canada.

The law applies (with the exceptions stated below) to any seagoing vessel of any type whatsoever of American registry or nationality, including floating craft towed by another vessel making a sea voyage; this includes a **"tanker"**, defined as a type of ship in which the greater part of the cargo space is constructed or adapted for the carriage of liquid cargoes in bulk and which is not, for the time being, carrying a cargo other than oil in that part of its cargo space. The excepted categories of vessels are: tankers of under 150 gross tons, and other ships of under 500 gross tons; ships for the time being engaged in the whaling industry when actually employed on whaling operations; ships for the time being navigating the Great Lakes of North America and their connecting and tributary waters as far east as the lower exit of St. Lambert Lock at Montreal in the Province of Quebec, Canada; naval ships and ships for the time being used as naval auxiliaries.

Foreign vessels to which the International Convention for the Prevention of the Pollution of the Sea by Oil (1954, as amended) applies, while in the territorial waters of the United States, may be boarded, examined, and required to produce records as provided in Section 11 of the Oil Pollution Act of 1961, as amended. (For a complete discussion of the Oil Pollution Regulations, see 33 CFR 151.)

The Federal Water Pollution Control Act, as amended, prohibits the discharge of a harmful quantity of oil or a hazardous substance into or upon the United States navigable waters or adjoining shorelines, or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974, or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States including resources under the Fishery Conservation and Management Act of 1976. Discharges that do occur must be reported to the Coast Guard (National Response Center) by the most rapid available means. To assist in swift reporting of spills, a nationwide, 24-hour, toll-free telephone number has been established (1-800-424-8802). If the spiller or any other industry, organization, or State or local government, does not clean up the spill, the Federal Government may. The spiller will be liable for the cleanup costs. A harmful discharge of oil has been defined as one which causes a film or sheen upon or discoloration of the surface of the water, violates applicable State water quality standards, or causes a sludge or emulsion to be deposited beneath the surface of the water. (For regulations pertaining to this Act, see 33 CFR 153.)

Other requirements for the protection of navigable waters.–U.S. laws prohibit discharge from any vessel or shore establishment of any refuse matter, other than that flowing from streets and sewers in a liquid state, into any navigable water. It is not lawful to tie up or anchor vessels or to float lografts in navigable channels in such manner as to obstruct normal navigation. When a vessel or raft is wrecked and sunk in a navigable channel it is the duty of the owner to immediately mark it with a buoy or beacon during the day and a light at night until the sunken craft is removed or abandoned.

Obligation of deck officers.–Licensed deck officers are required to acquaint themselves with the latest information published in Notice to Mariners regarding aids to navigation.

Improper use of searchlights prohibited.–No person shall flash or cause to be flashed the rays of a searchlight or other blinding light onto the bridge or into the pilothouse of any vessel underway. The International Code Signal "PG2" may be made by a vessel inconvenienced by the glare of a searchlight in order to apprise the offending vessel of the fact.

Unnecessary whistling prohibited.–The unnecessary sounding of the vessel's whistle is prohibited within any harbor limits of the United States.

Use of Radar.–Navigation Rules, International-Inland, Rule 7, states, in part, that every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist. Proper use shall be made of radar equipment if fitted and operational, including long-range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

This rule places an additional responsibility on vessels which are equipped and manned to use radar to do so while underway during periods of reduced visibility without in any way relieving commanding officers of the responsibility of carrying out normal precautionary measures.

Navigation Rules, International-Inland, Rules 6, 7, 8, and 19 apply to the use of radar.

Danger signal.–Navigation Rules, International-Inland, Rule 34(d), states that when vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal of at least five short and rapid flashes.

Narrow channels.–Navigation Rules, International-Inland, Rule 9(b) states: A vessel of less than 65.6 feet (20 meters) in length or a sailing vessel shall not impede the passage of a vessel that can safely navigate only within a narrow channel or fairway.

Control of shipping in time of emergency or war.–In time of war or national emergency, merchant vessels of the United States and those foreign flag vessels, which are considered under effective U.S. control, will be subject to control by agencies of the U.S. Government. The allocation and employment of such vessels, and of domestic port facilities, equipment, and services will be performed by appropriate agencies of the War Transport Administration. The movement, routing, and diversion of merchant ships at sea will be controlled by appropriate naval commanders. The movement of merchant ships within domestic ports and dispersal anchorages will be coordinated by the U.S. Coast Guard. The commencement of naval control will be signalled by a general emergency message. (See Pubs. 117A or 117B for emergency procedures and communication instructions.)

U.S. Flag Merchant Vessel Locator Filing System (USMER).–Pursuant to the Merchant Marine Act of 1936 and effective November 1, 1975, all U.S. flag merchant vessels of 1,000 gross registered tons or over engaged in foreign commerce departing U.S. ports are required to submit movement reports in accordance with the USMER system. The purpose of USMER is to keep national agencies and certain military authorities informed concerning arrivals, departures, and at-sea locations of U.S. flag merchant vessels throughout the world. Ships operating under control of the Military Sealift Command (MSC) are not required to submit USMER reports.

Complete USMER information is contained in a pamphlet prepared and distributed by the Maritime Administration, Department of Transportation. Copies of these pamphlets and additional information can be obtained from the Maritime Administration's regional offices in New York, New Orleans, San Francisco or its Office of Ship Operations, Division of Ship Management, in Washington, D.C. The USMER system is also published in Pubs. 117 A and B, published by the Defense Mapping Agency Hydrographic/Topographic Center.

U.S. Fishery Conservation Zone.–The United States exercises exclusive fishery management authority over all species of fish, except tuna, within the fishery conservation zone, whose seaward boundary is 200 miles from the baseline from which the U.S. territorial sea is measured; all anadromous species which spawn in the United States throughout their migratory range beyond the fishery conservation zone, except within a foreign country's equivalent fishery zone as recognized by the United States; all U.S. Continental Shelf Fishery resources beyond the fishery conservation zone. Such resources include American lobster and species of coral, crab, abalone, conch, clam, and sponge, among others.

No foreign vessel may fish, aid, or assist vessels at sea in the performance of any activity relating to fishing including, but not limited to preparation, supply, storage, refrigeration, transportation or processing, within the fishery conservation zone, or fish for anadromous species of the United States or Continental Shelf Fishery resources without a permit issued in accordance with U.S. law. These permits may only be issued to vessels from countries recognizing the exclusive fishery management authority of the United States in an international agreement. The owners or operators of foreign vessels desiring to engage in fishing off U.S. coastal waters should ascertain their eligibility from their own flag state authorities. Failure to obtain a permit prior to fishing, or failure to comply with the conditions and restrictions established in the permit may subject both vessel and its owners or operators to administrative, civil and criminal penalties. (Further details concerning foreign fishing are given in 50 CFR 611.)

Reports of foreign fishing activity within the fishery conservation zone should be made to the U.S. Coast Guard. Immediate reports are particularly desired, but later reports by any means also have value. Reports should include the activity observed, the position, and as much identifying information (name, number, homeport, type, flag, color, size, shape, etc.) about the foreign vessel as possible, and the reporting party's name and address or telephone number.

Bridge-to-Bridge Radiotelephone Communication.–Voice radio bridge-to-bridge communication between vessels is an effective aid in the prevention of collisions where there is restricted maneuvering room and/or visibility. VHF-FM radio is used for this purpose, due to its essentially line-of-sight characteristic and relative freedom from static. As VHF-FM has increasingly come into use for short-range communications in U.S. harbors and other high-traffic waters, so has the number of ships equipped with this gear increased.

The Vessel Bridge-to-Bridge Radiotelephone Regulations, effective January 1, 1973, require vessels subject to the Act while navigating to be equipped with at least one single channel transceiver capable of transmitting and receiving on VHF-FM channel 13 (156.65 MHz), the Bridge-to-Bridge Radiotelephone frequency. Vessels with multichannel equipment are required to have an additional receiver so as to be able to guard VHF-FM channel 13 (156.65 MHz), the Bridge-to-Bridge Radiotelephone frequency, in addition to VHF-FM channel 16 (156.80 MHz), the National Distress, Safety and Calling frequency required by Federal Communications Commission regulations. (See 26.01 through 26.10, chapter 2, for Vessel Bridge-to-Bridge Radiotelephone Regulations.)

Mariners are reminded that the use of bridge-to-bridge voice communications in no way alters the obligation to comply with the provisions of the RULES OF THE ROAD.

2. NAVIGATION REGULATIONS

This chapter contains the sections of **Code of Federal Regulations, Title 33, Navigation and Navigable Waters (33 CFR),** that are of most importance in the areas covered by Coast Pilot 7. The sections are from Part 26, Vessel Bridge-to-Bridge Radiotelephone Regulations; Part 80, COLREGS Demarcation Lines; Part 110, Anchorage Regulations; Part 117, Drawbridge Operation Regulations; Part 147, Safety Zones; Part 160, Ports and Waterways Safety; Part 161, Vessel Traffic Management; Part 162, Inland Waterways Navigation Regulations; Part 164, Navigation Safety Regulations (in part); Part 165, Safety Zones; Part 204, Danger Zone Regulations; Part 207, Navigation Regulations; and Part 209, Administrative Procedure.

Note.–These regulations can only be amended by the enforcing agency or other authority cited in the regulations. Accordingly, requests for changes to these regulations should be directed to the appropriate agency for action. In those regulations where the enforcing agency is not cited or is unclear, recommendations for changes should be directed to the following Federal agencies for action: U.S. Coast Guard (33 CFR 26, 80, 110, 117, 147, 160, 161, 162, 164, and 165); U.S. Army Corps of Engineers (33 CFR 204, 207, and 209).

Part 26–Vessel Bridge-to-Bridge Radiotelephone Regulations

§26.01 Purpose (a) The purpose of this part is to implement the provisions of the Vessel Bridge-to-Bridge Radiotelephone Act. This part–

(1) Requires the use of the vessel bridge-to-bridge radiotelephone;

(2) Provides the Coast Guard's interpretation of the meaning of important terms in the Act;

(3) Prescribes the procedures for applying for an exemption from the Act and the regulations issued under the Act and a listing of exemptions.

(b) Nothing in this part relieves any person from the obligation of complying with the rules of the road and the applicable pilot rules.

§26.02 Definitions. For the purpose of this part and interpreting the Act–

"Secretary" means the Secretary of the Department in which the Coast Guard is operating:

"Act" means the "Vessel Bridge-to-Bridge Radiotelephone Act", 33 U.S.C. sections 1201–1208;

"Length" is measured from end to end over the deck excluding sheer;

"Power-driven vessel" means any vessel propelled by machinery; and

"Towing vessel" means any commercial vessel engaged in towing another vessel astern, alongside, or by pushing ahead.

§26.03 Radiotelephone required. (a) Unless an exemption is granted under §26.09 and except as provided in paragraph (a)(4) of this section, section 4 of the Act provides that–

(1) Every power-driven vessel of 300 gross tons and upward while navigating;

(2) Every vessel of 100 gross tons and upward carrying one or more passengers for hire while navigating;

(3) Every towing vessel of 26 feet or over in length while navigating; and

(4) Every dredge and floating plant engaged in or near a channel or fairway in operations likely to restrict or affect navigation of other vessels: Provided, That an unmanned or intermittently manned floating plant under the control of a dredge need not be required to have separate radiotelephone capability.

Shall have a radiotelephone capable of operation from its navigational bridge, or in the case of a dredge, from its main control station, and capable of transmitting and receiving on the frequency or frequencies within the 156–162 Mega-Hertz band using the classes of emissions designated by the Federal Communications Commission, after consultation with other cognizant agencies, for the exchange of navigational information.

(b) The radiotelephone required by paragraph (a) of this section shall be carried on board the described vessels, dredges, and floating plants upon the navigable waters of the United States inside the lines established pursuant to section 2 of the Act of February 19, 1895 (28 Stat. 672), as amended.

§26.04 Use of the designated frequency. (a) No person may use the frequency designated by the Federal Communications Commission under section 8 of the Act, 33 U.S.C. 1207 (a), to transmit any information other than information necessary for the safe navigation of vessels or necessary tests.

(b) Each person who is required to maintain a listening watch under section 5 of the Act shall, when necessary, transmit and confirm, on the designated frequency, the intentions of his vessel and any other information necessary for the safe navigation of vessels.

(c) Nothing in these regulations may be construed as prohibiting the use of the designated frequency to communicate with shore stations to obtain or furnish information necessary for the safe navigation of vessels.

Note: The Federal Communications Commission has designated the frequency 156.65 MHz for the use of bridge-to-bridge radiotelephone stations.

§26.05 Use of radiotelephone. Section 5 of the Act states–(a) The radiotelephone required by this Act is for the exclusive use of the master or person in charge of the vessel, or the person designated by the master or person in charge of the vessel, or the person designated by the master or person in charge to pilot or direct the movement of the vessel, who shall maintain a listening watch on the designated frequency. Nothing contained herein shall be interpreted as precluding the use of portable radiotelephone equipment to satisfy the requirements of this Act.

§26.06 Maintenance of radiotelephone; failure of radiotelephone. Section 6 of the Act states–(a) Whenever radiotelephone capability is required by this Act, a vessel's radiotelephone equipment shall be maintained in effective operating condition. If the radiotelephone equipment carried aboard a vessel ceases to operate, the master shall exercise due diligence to restore it or cause it to be restored to effective operating condition at the earliest practicable time. The failure of a vessel's radiotelephone equipment shall not, in itself, constitute a violation of this Act, nor shall it obligate the master of any vessel to moor or anchor his vessel; however, the loss of radiotelephone capability shall be given consideration in the navigation of the vessel.

§26.07 English language. No person may use the services of, and no person may serve as a person required to maintain a listening watch under section 5 of the Act, 33 U.S.C. 1204 unless he can speak the English language.

§26.08 Exemption procedures. (a) Any person may petition for an exemption from any provision of the Act or this part:

(b) Each petition must be submitted in writing to U.S. Coast Guard (G–W), 2100 Second Street SW., Washington, DC 20593, and must state–

(1) The provisions of the Act or this part from which an exemption is requested; and

(2) The reasons why marine navigation will not be adversely affected if the exemption is granted and if the exemption relates to a local communication system how that system would fully comply with the intent of the concept of the Act but would not conform in detail if the exemption is granted.

§26.09 List of exemptions.

(a) All vessels navigating on those waters governed by the navigation rules for Great Lakes and their connecting and tributary waters (33 U.S.C. 241 et seq.) are exempt from the requirements of the Vessel Bridge-to-Bridge Radiotelephone Act and this part until May 6, 1975.

(b) Each vessel navigating on the waters under the navigation rules for the Great Lakes and their connecting and tributary waters (33 U.S.C. 241 et seq.) and to which the Vessel Bridge-to-Bridge Radiotelephone Act (33 U.S.C. 1201-1208) applies is exempt from the requirements in 33 U.S.C. 1203, 1204, and 1205 and the regulations under §§26.03, 26.04, 26.05, 26.06, and 26.07. Each of these vessels and each person to whom 33 U.S.C. 1208(a) applies must comply with Articles VII, X, XI, XII, XIII, XV, and XVI and Technical Regulations 1–7 of "The Agreement Between the United States of America and Canada for Promotion of Safety on the Great Lakes by Means of Radio, 1973."

§26.10 Penalties. Section 9 of the Act states–(a) Whoever, being the master or person in charge of a vessel subject to the Act, fails to enforce or comply with the Act or the regulations hereunder; or whoever, being designated by the master or person in charge of a vessel subject to the Act to pilot or direct the movement of a vessel fails to enforce or comply with the Act or the regulations hereunder–is liable to a civil penalty of not more than $500 to be assessed by the Secretary.

(b) Every vessel navigated in violation of the Act or the regulations hereunder is liable to a civil penalty of not more than $500 to be assessed by the Secretary, for which the vessel may be proceeded against in any District Court of the United States having jurisdiction.

(c) Any penalty assessed under this section may be remitted or mitigated by the Secretary, upon such terms as he may deem proper.

Part 80–COLREGS Demarcation Lines

§80.01 General basis and purpose of demarcation lines. (a) The regulations in this part establish the lines of demarcation delineating those waters upon which mariners must comply with the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) and those waters upon which mariners must comply with the Navigation Rules for Harbors, Rivers, and Inland Waters (Inland Rules).

(b) The waters inside of the lines are Inland Rules Waters. The waters outside the lines are COLREGS Waters.

(c) The regulations in this part do not apply to the Great Lakes or their connecting and tributary waters as described in 33 CFR 97, or the Western Rivers as described in 33 CFR 95. (33 CFR 97 and 33 CFR 95 are not published in this Coast Pilot.)

§80.1105 Santa Catalina Island, Calif.

The 72 COLREGS shall apply to the harbors on Santa Catalina Island.

§80.1110 San Diego Harbor, Calif.

A line drawn from Zuniga Jetty Light "V" to Zuniga Jetty Light "Z"; thence to Point Loma Light.

§80.1115 Mission Bay, Calif.

A line drawn from Mission Bay South Jetty Light 2 to Mission Bay North Jetty Light 1.

§80.1120 Oceanside Harbor, Calif.

A line drawn from Oceanside South Jetty Light 4 to Oceanside Breakwater Light 3.

§80.1125 Dana Point Harbor, Calif.

A line drawn from Dana Point Jetty Light 6 to Dana Point Breakwater Light 5.

§80.1130 Newport Bay, Calif.

A line drawn from Newport Bay East Jetty Light 4 to Newport Bay West Jetty Light 3.

§80.1135 San Pedro Bay–Anaheim Bay, Calif. (a) A line drawn from Anaheim Bay East Jetty Light 6 to Anaheim Bay West Jetty Light 5; thence to Long Beach Breakwater East End Light.

(b) A line drawn from Long Beach Channel Entrance Light 2 to Long Beach Light.

(c) A line drawn from Los Angeles Main Entrance Channel Light 2 to Los Angeles Light.

§80.1140 Redondo Harbor, Calif.

A line drawn from Redondo Beach East Jetty Light 2 to Redondo Beach West Jetty Light 3.

§80.1145 Marina Del Rey, Calif. (a) A line drawn from Marina Del Rey Breakwater South Light 1 to Marina Del Rey Light 4.

(b) A line drawn from Marina Del Rey Breakwater North Light 2 to Marina Del Rey Light 3.

(c) A line drawn from Marina Del Rey Light 4 to the seaward extremity of the Ballona Creek South Jetty.

§80.1150 Port Hueneme, Calif.

A line drawn from Port Hueneme East Jetty Light 4 to Port Hueneme West Jetty Light 3.

§80.1155 Channel Islands Harbor, Calif. (a) A line drawn from Channel Islands Harbor South Jetty Light 2 to Channel Islands Harbor Breakwater South Light 1.

(b) A line drawn from Channel Islands Harbor Breakwater North Light to Channel Islands Harbor North Jetty Light 5.

§80.1160 Ventura Marina, Calif.

A line drawn from Ventura Marina South Jetty Light 2 to Ventura Marina Breakwater South Light 1; thence to Ventura Marina North Jetty Light 3.

§80.1165 Santa Barbara Harbor, Calif.

A line drawn from Santa Barbara Harbor Light 4 to Santa Barbara Harbor Breakwater Light.

§80.1205 San Luis Obispo Bay, Calif.

A line drawn from the southernmost extremity of Fossil Point to the seaward extremity of Whaler Island Breakwater.

§80.1210 Estero-Morro Bay, Calif.

A line drawn from the seaward extremity of the Morro Bay East Breakwater to the Morro Bay West Breakwater Light.

§80.1215 Monterey Harbor, Calif.

A line drawn from Monterey Harbor Light 6 to the northern extremity of Monterey Municipal Wharf 2.

§80.1220 Moss Landing Harbor, Calif.

A line drawn from the seaward extremity of the pier located 0.3 mile south of Moss Landing Harbor Entrance to the seaward extremity of the Moss Landing Harbor North Breakwater.

§80.1225 Santa Cruz Harbor, Calif.

A line drawn from the seaward extremity of the Santa Cruz Harbor East Breakwater to Santa Cruz Harbor West Breakwater Light; thence to Santa Cruz Light.

§80.1230 Pillar Point Harbor, Calif.

A line drawn from Pillar Point Harbor Light 6 to Pillar Point Harbor Light 5.

§80.1250 San Francisco Harbor, Calif.

A straight line drawn from Point Bonita Light through Mile Rocks Light to the shore.

§80.1255 Bodega and Tomales Bay, Calif. (a) An east-west line drawn from Sand Point to Avalis Beach.

(b) A line drawn from the seaward extremity of Bodega Harbor North Breakwater to Bodega Harbor Entrance Light 1.

§80.1260 Albion River, Calif.

A line drawn on an axis of 030° true through Albion River Light 1 across Albion Cove.

§80.1265 Noyo River, Calif.

A line drawn from Noyo River Entrance Daybeacon 4 to Noyo River Entrance Light 5.

§80.1270 Arcata-Humboldt Bay, Calif.

A line drawn from Humboldt Bay Entrance Light 4 to Humboldt Bay Entrance Light 3.

§80.1275 Crescent City Harbor, Calif.

A line drawn from Crescent City Outer Breakwater Light to the southeasternmost extremity of Whaler Island.

§80.1305 Chetco River, Oreg.

A line drawn from the seaward extremity of the Chetco River South Jetty to Chetco River Entrance Light 5.

§80.1310 Rogue River, Oreg.

A line drawn from the seaward extremity of the Rogue River Entrance South Jetty to Rogue River North Jetty Light 3.

§80.1315 Coquille River, Oreg.

A line drawn across the seaward extremity of the Coquille River Entrance Jetties.

§80.1320 Coos Bay, Oreg.

A line drawn across the seaward extremity of the Coos Bay Entrance Jetties.

§80.1325 Umpqua River, Oreg.

A line drawn across the seaward extremity of the Umpqua River Entrance Jetties.

§80.1330 Siuslaw River, Oreg.

A line drawn from the seaward extremity of the Siuslaw River Entrance South Jetty to Siuslaw River Light 9.

§80.1335 Alsea Bay, Oreg.

A line drawn from the seaward shoreline on the north of the Alsea Bay Entrance 165° true across the channel entrance.

§80.1340 Yaquina Bay, Oreg.

A line drawn from the seaward extremity of Yaquina Bay Entrance South Jetty to Yaquina Bay North Jetty Light 5.

§80.1345 Depoe Bay, Oreg.

A line drawn across the Depoe Bay Channel entrance parallel with the general trend of the highwater shoreline.

§80.1350 Netarts Bay, Oreg.

A line drawn from the northernmost extremity of the shore on the south side of Netarts Bay north to the opposite shoreline.

§80.1355 Tillamook Bay, Oreg.

A north-south line drawn from the lookout tower charted on the north side of the entrance to Tillamook Bay south to the Tillamook Bay South Jetty.

§80.1360 Nehalem River, Oreg.

A line drawn approximately parallel with the general trend of the highwater shoreline across the Nehalem River Entrance.

§80.1365 Columbia River Entrance, Oreg./Wash.

A line drawn from the seaward extremity of the Columbia River North Jetty (above water) 155° true to the seaward extremity of the Columbia River South Jetty (above water).

§80.1370 Willapa Bay, Wash.

A line drawn from Willapa Bay Light 171° true to the westernmost tripod charted 1.6 miles south of Leadbetter Point.

§80.1375 Grays Harbor, Wash.

A line drawn from across the seaward extremity (above water) of the Grays Harbor Entrance Jetties.

§80.1380 Quillayute River, Wash.

A line drawn from the seaward extremity of the Quillayute River Entrance East Jetty to the overhead power cable tower charted on James Island; thence a straight line through Quillayute River Entrance Light 3 to the shoreline.

§80.1385 Strait of Juan de Fuca. (a) The 72 COLREGS shall apply on Neah Bay and the waters inside Ediz Hook (Port Angeles Harbor).

(b) A line drawn from New Dungeness Light through Puget Sound Traffic Lane Entrance Lighted Buoy S to Rosario Strait Traffic Lane Entrance Lighted Horn Buoy R; through Hein Bank Lighted Bell Buoy to Cattle Point Light.

§80.1390 Haro Strait and Strait of Georgia. (a) The 72 COLREGS shall apply on the bays of the southwest coast of San Juan Island from Cattle Point Light to Lime Kiln Light.

(b) A line drawn from Lime Kiln Light to Kellett Bluff Light; thence to Turn Point Light; thence to Skipjack Island Light; thence to Sucia Island Daybeacon 1.

(c) A line drawn from the shoreline of Sucia Island at latitude 48°46.1'N. longitude 122°53.5'W. through Clements Reef Buoy 2 to Alden Bank Lighted Gong Buoy A; thence to the westernmost tip of Birch Point at latitude 48°56.6'N. longitude 122°49.2'W.

(d) The 72 COLREGS shall apply in Semiamoo Bay and Drayton Harbor.

§80.1410 Hawaiian Island Exemption from General Rule.

Except as provided elsewhere in this part for Mamala Bay and Kaneohe Bay on Oahu; Port Allen and Nawiliwili Bay on Kauai; Kahului Harbor on Maui; and Kawailae and Hilo Harbors on Hawaii, the 72 COLREGS shall apply on all other bays, harbors, and lagoons of the Hawaiian Island (including Midway).

§80.1420 Mamala Bay, Oahu, Hawaii.

A line drawn from Barbers Point Light to Diamond Head Light.

§80.1430 Kaneohe Bay, Oahu, Hawaii.

A straight line drawn from Pyramid Rock Light across Kaneohe Bay through the center of Mokolii Island to the shoreline.

§80.1440 Port Allen, Kauai, Hawaii.

A line drawn from Hanapepe Light to Hanapepe Bay Breakwater Light.

§80.1450 Nawiliwili Harbor, Kauai, Hawaii.

A line drawn from Nawiliwili Harbor Breakwater Light to Kukii Point Light.

§80.1460 Kahului Harbor, Maui, Hawaii.

A line drawn from Kahului Harbor Entrance East Breakwater Light to Kahului Harbor Entrance West Breakwater Light.

§80.1470 Kawaihae Harbor, Hawaii.

A line drawn from Kawaihae Light to the seaward extremity of the Kawaihae South Breakwater.

§80.1480 Hilo Harbor, Hawaii.

A line drawn from the seaward extremity of the Hilo Breakwater 265° true (as an extension of the seaward side of the breakwater) to the shoreline 0.2 nautical mile north of Alealea Point.

§80.1495 U.S. Pacific Island Possessions.

The 72 COLREGS shall apply on the bays, harbors, lagoons, and waters surrounding the U.S. Pacific Island Possessions of American Samoa, Baker, Canton, Howland, Jarvis, Johnson, Palmyra, Swains, and Wake Island. (The Trust Territory of the Pacific Islands is not a U.S. possession, and therefore PART 80 does not apply thereto.)

Part 110–Anchorage Regulations

§110.1 General. (a) The areas described in Subpart A of this part are designated as special anchorage areas pursuant to the authority contained in an act amending laws for preventing collisions of vessels approved April 22, 1940 (54 Stat. 150); Article 11 of section 1 of the act of June 7, 1897, as amended (30 Stat. 98; 33 U.S.C. 180), Rule 9 of section 1 of the act of February 8, 1895, as amended (28 Stat. 647; 33 U.S.C. 258), and Rule Numbered 13 of section 4233 of the Revised Statutes as amended (33 U.S.C. 322). Vessels not more than 65 feet in length, when at anchor in any special anchorage area shall not be required to carry or exhibit the white anchor lights required by the Navigation Rules.

(b) The anchorage grounds for vessels described in Subpart B of this part are established, and the rules and regulations in relation thereto adopted, pursuant to the authority contained in section 7 of the act of March 4, 1915, as amended (38 Stat. 1053; 33 U.S.C. 471).

(c) All bearings in the part are referred to true meridian.

Subpart A–Special Anchorage Areas

§110.90 San Diego Harbor, California.

(a) Area A-1. In the Municipal Yacht Harbor, the water area enclosed by a line beginning at latitude 32°42'56.5"N., longitude 117°13'44"W.; thence southwest to latitude 32°42'53.4"N., longitude 117°13'48.2"W.; thence northwest to latitude 32°43'01.1"N., longitude 117°13'56"W.; thence northeast to latitude 32°43'02.4"N., longitude 117°13'52.4"W.; thence southeast to latitude 32°42'59.6"N., longitude 117°13'47.3"W.; thence to point of beginning.

NOTE: Control over the anchoring of vessels and the placing of temporary moorings in the area is exercised by the San Diego Unified Port District pursuant to local ordinances.

(b) Area A-2. In the Commercial Basin, the water area enclosed by a line beginning at latitude 32°43'13.9"N.; longitude 117°13'21"W.; thence northeast to latitude 32°43'16.2"N., longitude 117°13'13.2"W.; thence northwest to latitude 32°43'22.1"N., longitude 117°13'23.7"W., thence west to latitude 32°43'22"N., longitude 117°13'26.8"W.; thence southwest to latitude 32°43'19"N., longitude 117°13'29.2"W.; thence southeast to the point of beginning.

NOTE: Control over the anchoring of vessels and the placing of temporary moorings in the area is exercised by the San Diego Unified Port District pursuant to local ordinances.

(c) (Reserved)

(d) Area A-5. In Glorietta Bay, the water area enclosed by a line beginning at latitude 32°40'42"N., longitude 117°10'00"W.; thence southwest to latitude 32°40'41"N., longitude 117°10'03.5"W.; thence northwest to latitude 32°40'46"N., longitude 117°10'12.5"W; thence northeast to latitude 32°40'46.5"N., longitude 117°10'11"W; thence southeast to point of beginning.

NOTE: Control over the anchoring of vessels and the placing of temporary moorings in the area is exercised by the San Diego Unified Port District pursuant to local ordinances.

§110.91 Mission Bay, California. (a) Area M-1. In San Juan Cove, the entire water area west of a line drawn from Santa Clara Point Light; latitude 32°46'53.6"N., longitude 117°14'52.5"W.; to El Carmel Point North Light; latitude 32°46'48.0"N., longitude 117°14'50.1"W.

Note.-Control over the anchoring of vessels and the placing of temporary moorings in this area is exercised by the City of San Diego Park and Recreation Department pursuant to local ordinances.

(b) Area M-2. In Santa Barbara Cove, the entire water area west of a line drawn from El Carmel Point South Light; latitude 32°46'40.0"N., longitude 117°14'47.0"W.; to Bahia Point Light; latitude 32°46'33.5"N., longitude 117°14'45.5"W.

Note.-Control over the anchoring of vessels and the placing of temporary mooring in this area is exercised by the City of San Diego Park and Recreation Department pursuant to local ordinances.

(c) Area M-3. In Mariners Basin, the entire water area west of a line drawn from Mariners Point Light; latitude 32°45'49.2"N., longitude 117°14'42.9"W.; to Mission Point Light; latitude 32°45'43.7"N., longitude 117°14'41.9"W.

Note.-Control over the anchoring of vessels and the placing of temporary moorings in this area is exercised by the City of San Diego Park and Recreation Department pursuant to local ordinances.

(d) Area M-4. In Quivira Basin, the water area enclosed by that portion of a circle of 45 yard radius from Quivira Basin Light 2; latitude 32°45'42.8"N., longitude 117°14'25.6"W.; through the arc from 354°T to 088°T.

Note.-This area is reserved for vessels under impound or control of the City of San Diego Park and Recreation Department Mission Bay Harbor Police.

§110.93 Dana Point Harbor, Calif.

The area in Dana Point Harbor, Calif. commencing at a point at latitude 33°27'36.2"N. longitude 117°42'20.4"W.; thence 016°20' True for 612 feet to a point at latitude 33°27'42.1"N., longitude 117°42'18.4"W.; thence 106°20' True for 85 feet to a point at latitude 33°27'41.8"N., longitude 117°42'17.7"W.; thence 196°20' True for 222 feet to a point at latitude 33°27'39.7"N., longitude 117°42'18.2"W.; thence 182°20' True 234 feet to a point at latitude 33°27'37.4"N., longitude 117°42'18.2"W.; thence 166°20' True for 499 feet to a point at latitude 33°27'32.6"N., longitude 117°42'16.8"W.; thence 320° True for 470 feet to the point of origin.

§110.95 Newport Bay Harbor, Calif. (a) Area A-1. In Lido Channel, northeast of a line parallel to and 195 feet from the pierhead line along the southwest shore of Lido Isle; north of the south U.S. Bulkhead line off Lido Isle extended; southwest of a line parallel to and 120 feet from the pierhead line along the southwest shore of Lido Isle; and southeast of the north side of Via Barcelona, on Lido Isle, extended.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(b) Area A-2. East of the east side of 15th Street extended; north of a line parallel to and 250 feet from the pierhead line between 14th and 15th Streets, this line being the north line of Newport Channel, and extending east in a straight line to an intersection with a line bearing 268° from the flashing red beacon on the southeast end of Lido Isle, this line being the northwest line of the main fairway; west of the east side of 13th Street extended; and south of a line parallel to and 220 feet from the pierhead line off the south shore of Lido Isle.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(c) Area A-3. A rectangular area, 40 feet wide and 885 feet long, on the west side of Upper Bay Channel, 120 feet east of and parallel to the west pierhead line, the south end being 50 feet north from U.S. Bulkhead Station 130.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to Orange County Harbor Ordinance No. 490 for recreational and small craft of such size and alignment as permitted by the harbor master.

(d) Area A-4. South of a line bearing 268° from the flashing green beacon off Bay Island and passing through the beacon off 13th Street, this line being the south line of the main fairway; north of a line parallel to and 200 feet from the pierhead line off 11th to 8th Streets; and west of a line bearing 203° from the flashing red beacon at the south extremity of Bay Shores, passing through the pierhead line at the east end of Lido Isle.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(e) Area A-5 (Newport Harbor Yacht Club). East of a line bearing 23° from the center of the north end of 8th Street, being parallel to and 150 feet distant from the east end of Area A-4; north of a line parallel to and 200 feet from the pierhead line off 7th and 8th Streets; northwest of a line parallel to and 200 feet from the northwest pierhead line off Bay Island; and south of a line bearing 268° from the flashing green beacon off Bay Island and passing through the beacon off 13th Street, this line being the southerly line of the main fairway.

NOTE: This area is reserved for recreational and other small craft. Single moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for pleasure boats and yachts of such sizes and alignments as permitted by the harbor master.

(f) Area A-6. Northwest of Harbor Island, beginning at a point on the Newport City line 107 feet from the angle point northwest of Harbor Island; thence 36°27′, 55 feet; thence 303°18′, 300 feet; thence 216°27′, 72 feet; thence 165°12′, 211 feet; thence 75°11′44″, approximately 216 feet, to the point of beginning.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to Orange County Harbor Ordinance No. 490 for recreational and small craft of such size and alignment as permitted by the harbor master.

(g) Area A-7. East of a line parallel to and 150 feet from the east pierhead line off Bay Island; north of a line parallel to and 150 feet from the pierhead line off Fernando Street; northwest of the east side of Adams Street extended; and southwest of a line bearing 131° from the flashing green beacon off Bay Island, being parallel to and 100 feet southwest of the southwest line of the main channel.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(h) Area A-8. Northeast of a line parallel to and 270 feet from the southwest pierhead line from Collins Isle to Balboa Island; north of a line bearing 311° from the flashing red beacon off the southwest point of Balboa Island and passing through the flashing red beacon off the south point of Bay Shore, this line being the northeast line of the main channel; southwest of a line parallel to and 150 feet from the southwest pierhead line from Collins Isle to Balboa Island; and southeast of a line bearing 238° from U.S. Station 160.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(i) Area A-9. In Balboa Island Channel, east of a line bearing due north from U.S. Station 151, being 25 feet west of the end of Emerald Avenue; north of a line parallel to and 75 feet from the north pierhead line off Balboa Island; west of the east side of Amethyst Avenue extended; and south of a line parallel to and 150 feet from the north pierhead line of Balboa Island.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(j) Area A-10. Southeast of a line bearing 209° from the flashing red beacon on the southwest point of Balboa Island and passing through the east side of the end of "A" Street; north of an irregular line parallel to and 150 feet from the north pierhead line off Balboa Peninsula from "A" to "K" Streets; south of the south line of the main channel; and south and southeast of an irregular line parallel to and 375 feet from the north pierhead line off Balboa Peninsula.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(k) Area A-11. Northeast of a line bearing 108°30′ from the flashing red beacon at the southwest point of Balboa Island, passing through the flashing red channel buoy No. 4, this line being the northeast line of the main channel; north of a line parallel to and 350 feet from the south pierhead line off Balboa Island; west of the west bulkhead line of the Grand Canal extended; and south of a line parallel to and 150 feet from the south pierhead line off Balboa Island.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for recreational and small craft of such size and alignment as permitted by the harbor master.

(l) Area A-12 (Balboa Yacht Club). South of a line parallel to and 150 feet from the south pierhead line off Balboa Island; west of the east end pierhead line off Balboa Island extended and bearing 161°; north of a line parallel to and 700 feet from the south pierhead line off Balboa Island; and east of a line parallel to and 1,000 feet from the east boundary, bearing 161° from the point of intersection of the east bulkhead line of Grand Canal and the south bulkhead line off Balboa Island.

NOTE: This area is reserved for recreational and other small craft. Single moorings will be allowed in this area conforming to the City of Newport Beach Harbor Ordinance No. 543 for pleasure boats and yachts of such sizes and alignments as permitted by the harbor master.

(m) (Reserved)

(n) Area B-1. Southeast of a line bearing 227° from the flashing red beacon at the southwest corner of Lido Isle and being parallel to and 200 feet from the pierhead line off the southeast end of Rhine Point; northeast of the southwest bulkhead line off Rhine Point extended; north of a line parallel to and 250 feet from the pierhead line between 15th and 18th Streets, this line being the north line of Newport Channel; west of the west side of 15th Street extended; and south of a line parallel to and 220 feet from the pierhead line off the south shore of Lido Isle.

NOTE: This area is reserved for recreational and other small craft. Fore and aft moorings, conforming to the City of Newport Beach Harbor Ordinance No. 543, will be allowed in this area for recreational and small craft of such size and alignment as permitted by the harbor master.

§110.100 Los Angeles and Long Beach Harbors, Calif. (a) (Reserved)

(b) Area A-2. Consisting of two parts in the outer basin of Fish Harbor on the east and west sides of Fish Harbor Entrance Channel described as follows:

(1) Part 1. Beginning at a point at the intersection of westerly side of Fish Harbor Entrance Channel and the outer jetty; thence southwesterly along the jetty about 900 feet to the shore; thence northerly about 500 feet; thence northeasterly about 650 feet, on a line parallel to jetty; thence southeasterly about 500 feet, along the westerly side of Fish Harbor Entrance Channel to the point of beginning.

(2) Part 2. Beginning at a point at the intersection of the east side of Fish Harbor Entrance Channel and Fish Harbor mole (outer Fish Harbor); thence northwesterly along the channel line about 850 feet to the southerly side of the Fairway; thence northeasterly and easterly along the southerly side of the Fairway, about 478 and 565 feet respectively to its intersection with Fish Harbor mole; thence southerly and southwesterly along the mole to the point of beginning.

§110.105 Avalon Bay, Santa Catalina Island, Calif. Shoreward of a line connecting the promontories known as Casino Point and Bathhouse Point; excluding therefrom the fairways as established by the harbor master, City of Avalon.

NOTE: This area is reserved for yachts and other small craft. Moorings will be allowed in this area conforming to the City of Avalon Ordinance No. 264 of such size and alignment as permitted by the harbor master.

§110.110 Santa Monica Harbor, Calif. The waters enclosed by a line 1,000 feet southwest of and parallel to the axis of the Santa Monica breakwater and extending 2,000 feet northwest and 2,000 feet southeast of the ends of the breakwater, lines extending shoreward from and normal to each end of the said line, and the mean high tide line; excluding therefrom the fairways as established by the harbor master, City of Santa Monica.

NOTE: This area is reserved for small craft. Fore and aft moorings will be allowed in this area conforming to the City of Santa Monica Harbor Ordinances Nos. 541, 705, 706, and 1356 for recreational and other small craft of such size and alignment as permitted by the harbor master. Fixed mooring piles or stakes are prohibited.

§110.111 Marina del Rey Harbor, Calif. An area in the main channel within the following described boundaries:

Beginning at the most northeasterly corner at latitude 33°58′58″, longitude 118°26′46″; thence southerly to latitude 33°58′53″, longitude 118°26′46″; thence southeasterly to latitude 33°58′52″, longitude 118°26′45″; thence southerly to latitude 33°58′39″, longitude 118°26′45″; thence westerly to latitude 33°58′38″, longitude 118°26′55″; thence northerly to latitude 33°59′00″ longitude 118°26′55″; thence easterly to the point of beginning.

NOTE: This area is reserved for yachts and other recreational craft and for all types of small craft during storm, stress, or other emergency. Single and fore-and-aft moorings will be allowed in the area as permitted by the Director of the Department of Small Craft Harbors, Los Angeles County.

§110.115 Santa Barbara Harbor, Calif. North of the Santa Barbara breakwater; seaward of the line of mean high water; and southwest of a line bearing 46°30′ from the north corner of Bath Street and Cabrillo Boulevard to the end of the Santa Barbara breakwater; excluding a fairway 225 feet wide, 100 feet from each side of and parallel to the Navy pier.

NOTE: Fore and aft moorings will be allowed in this area conforming to the City of Santa Barbara Harbor Ordinance No. 2106 for yachts and small craft of such size and alignment as permitted by the harbor master.

§110.120 San Luis Obispo Bay, Calif.(a) Area A-1. Area A-1 is the water area bounded by the San Luis Obispo County wharf, the shoreline, a line drawn from the southernmost point of Fossil Point to latitude 35°10′18.5″N., longitude 120°43′38.5″W.; thence to the southeast corner of the San Luis Obispo County wharf.

(b) Area A-2. Area A-2 is the water area enclosed by a line drawn from the outer end of Whaler Island breakwater at latitude 35°09′22″N., longitude 120°44′56″W., to the Marre Chimney at latitude 35°10′56″N., longitude 120°44′31″W.

Note: The Port San Luis Harbor District prescribes local regulations for mooring and boating activities in these areas.

§110.125 Morro Bay Harbor, Calif. (a) Area A-1. Opposite the City of Morro Bay, beginning 50 feet west of the intersection of the west channel line and the prolongation of the center line of Seventh Street; thence in a generally southeasterly direction and parallel to the channel line for a distance of 450 yards; thence 166° and parallel to the revetment for a distance of 1,025 yards; thence 270° for a distance of 200 yards; thence 346° for a distance of about 1,425 yards to meet the prolongation of the center line of Seventh Street; and thence to the point of beginning.

(b) Area A-2. Beginning at a point 322° and 150 feet from the high water line on the most westerly part of Fairbanks Point; thence continuing on this bearing for a distance of 1,346 feet; thence 52° for a distance of 450 feet and thence generally southeasterly parallel to and 150 feet from the mean high water line to the point of beginning.

NOTE: Moorings and boating activities will be allowed in these areas conforming to applicable City of Morro Bay ordinances and regulations adopted pursuant thereto.

§110.126 Monterey Harbor, Calif. The waters of Monterey Harbor between the shoreline and the following coordinates: Beginning at a point on the Coast Guard Wharf at latitude 36°36'33.2"N., longitude 121°53'29.8"W.; thence to latitude 36°36'32.4"N., longitude 121°53'31"W.; thence in an easterly direction to latitude 36°36'27.8"N., longitude 121°53'16"W.; thence to latitude 36°36'20"N., longitude 121°52'58"W.; thence to the shoreline at latitude 36°36'04"N., longitude 121°52'54"W.; excluding from this area a fairway 125 feet wide whose centerline begins at latitude 36°36'27.8"N., longitude 121°53'16"W.; and extends 205°, approximately 405 feet to latitude 36°36'24"N., longitude 121°53'18.3"W.; thence 225° approximately 850 feet to the Monterey Marina entrance. Also excluded are the waters between this fairway and the north end of Municipal Wharf No. 2 and the eastern part of Municipal Wharf No. 1.

§110.126a San Francisco Bay, California. Richardson Bay Anchorage. That portion of Richardson Bay, north of a line bearing 257° from Peninsula Point to the shore at Sausalito, except for federally-maintained channels, and all channels approved for private use therein.

Note.–An ordinance of the City of Sausalito requires the City's written consent before any vessel is moored or anchored in the portion of this special anchorage area known as the waters of Dunphy Park.

§110.127 Lake Mohave and Lake Mead, Nevada and Arizona. (a) Willow Beach, Ariz. That portion of Lake Mohave enclosed by the shore and a line connecting the following points, excluding a 100-foot-wide fairway, extending westerly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 35°52'30"N., 114°39'35"W.
"b" 35°52'10"N., 114°39'35"W.

(b) Katherine, Ariz. That portion of Lake Mohave enclosed by the shore and a line connecting the following points, excluding a 100-foot-wide fairway, extending westerly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 35°13'33"N., 114°34'38"W.
"b" 35°13'05"N., 114°34'40"W.

(c) El Dorado Canyon, Nev. That portion of Lake Mohave enclosed by the shore and a line connecting the following points, excluding a 50-foot-wide fairway, extending easterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 35°42'37"N., 114°42'21"W.
"b" 35°42'08"N., 114°42'10"W.

(d) Cottonwood Cove, Nev. That portion of Lake Mohave enclosed by the shore and a line connecting the following points, excluding a 200-foot-wide fairway extending northeasterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 35°29'46"N., 114°40'55"W.
"b" 35°29'33"N., 114°40'45"W.

(e) Overton Beach, Nev.–(1) Area "A". That portion of Lake Mead enclosed by the shore and lines connecting the following points, excluding two 300-foot-wide fairways, extending northwesterly and southwesterly from the launching ramps, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°27'05"N., 114°21'48"W.
"b" 36°27'15"N., 114°21'20"W.
"c" 36°26'32"N., 114°20'45"W.
"d" 36°25'49"N., 114°20'50"W.
"e" 36°25'00"N., 114°21'27"W.
"f" 36°25'19"N., 114°22'10"W.

(f) Echo Bay, Nev. That portion of Lake Mead enclosed by the shore and lines connecting the following points, excluding a 100-foot-wide fairway, extending southwesterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°18'30"N., 114°25'10"W.
"b" 36°18'20"N., 114°24'00"W.
"c" 36°17'35"N., 114°24'05"W.
"d" 36°17'40"N., 114°24'27"W.

(g) Callville Bay, Nev. That portion of Lake Mead enclosed by the shore and lines connecting the following points, excluding a 200-foot-wide fairway, extending southeasterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°09'00"N., 114°42'40"W.
"b" 36°08'10"N., 114°42'03"W.
"c" 36°08'06"N., 114°42'40"W.

(h) Las Vegas Wash, Nev. That portion of Lake Mead enclosed by the shore and a line connecting the following points, excluding a 200-foot-wide fairway, extending easterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°07'23"N., 114°49'45"W.
"b" 36°06'29"N., 114°49'45"W.

(i) Hemenway Harbor, Nev. That portion of Lake Mead enclosed by the shore and lines connecting the following points, excluding a 100-foot-wide fairway, extending easterly from the launching ramp at Boulder Beach and a 600-foot-wide fairway, extending northeasterly from the launching ramp at Hemenway Harbor, both as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°04'05"N., 114°48'15"W.
"b" 36°03'25"N., 114°48'10"W.
"c" 36°01'20"N., 114°45'15"W.

(j) Kingman Wash, Ariz. That portion of Lake Mead enclosed by the shore and a line connecting the following points, excluding a 100-foot-wide fairway, extending westerly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°02'34"N., 114°42'50"W.
"b" 36°02'05"N., 114°43'05"W.

(k) Temple Bar, Ariz. That portion of Lake Mead enclosed by the shore and lines connecting the following points, excluding a 200-foot-wide fairway, extending southwesterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°02'21"N., 114°19'29"W.
"b" 36°02'34"N., 114°18'46"W.
"c" 36°02'03"N., 114°18'13"W.

(l) Greggs, Ariz. That portion of Lake Mead enclosed by the shore and a line connecting the following points, excluding a 100-foot-wide fairway, extending northerly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°00'35"N., 114°13'49"W.
"b" 36°00'35"N., 114°14'10"W.

(m) Pierce Ferry, Ariz. That portion of Lake Mead enclosed by the shore and a line connecting the following points, excluding a 100-foot-wide fairway, extending easterly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°08'42"N., 113°59'24"W.
"b" 36°07'18"N., 113°58'32"W.

(n) South Bay, Ariz. That portion of Lake Mead enclosed by the shore and a line connecting the following points, excluding one 100-foot wide fairway, extending westerly from the launching ramp, as established by the Superintendent, Lake Mead Recreation Area:

"a" 36°06'26"N., 114°06'13"W.
"b" 36°05'00"N., 114°06'50"W.
"c" 36°05'00"N., 114°06'13"W.

Note: Fixed moorings, piles, or stakes are prohibited. Single and fore and aft temporary moorings will be allowed. The anchoring of vessels and the placing of temporary moorings will be under the jurisdiction and at the discretion of the Superintendent, Lake Mead Recreation Area, National Park Service.

§110.127a and 110.127b. (Do not apply to this Coast Pilot.)

§110.127c Trinidad Bay, Calif. The waters of Trinidad Bay beginning at the southernmost point of Trinidad Head at latitude 41°03'04"N., longitude 124°08'56"W.; thence east to Prisoner Rock at latitude 41°03'09"N., longitude 124°08'37"W.; thence east to latitude 41°03'09"N., longitude 124°03'19"W.; thence north to latitude 41°03'26"N., longitude 124°08'21"W.; thence following the shoreline to Trinidad Bay in a westerly and southerly direction to the point of beginning.

NOTE.–The area will be principally for use by sport and commercial fishing vessels. Temporary floats and buoys for anchoring will be allowed in the area. Fixed moorings, piles or stakes are prohibited. All moorings shall be placed so that no vessel when anchored or moored shall at any time extend beyond the limits of the area. The anchoring of all vessels and placing of all moorings will be under the supervision of the City of Trinidad or such other authority as may be designated by the City Council of the City of Trinidad, California.

§110.128 Columbia River at Portland, Oreg. The waters of the Columbia River between Sand Island and Government Island, bounded on the west by pile dike U.S. 5.75 and a line extending true north from the northerly end of the dike to the south shore of Sand Island and bounded on the east by a line bearing 339°15' true, from a point on Government Island at latitude 45°35'10", longitude 122°32'41", to the southerly shore of Sand Island.

§110.128a Lahaina, Island of Maui, Hawaii. The water area of the Pacific Ocean, west of Lahaina, Hawaii enclosed by a line beginning at latitude 20°52'39"N., longitude 156°41'11"W.; thence to latitude 20°52'40"N., longitude 156°41'09"W.; thence to latitude 20°52'32"N., longitude 156°41'03"W.; thence to latitude 20°52'31"N., longitude 156°41'04"W.; thence to the point of beginning.

§110.128b Island of Hawaii, Hawaii. (a) Hilo Bay. The waters of Hilo Bay enclosed by a line beginning at 19°43'55.5"N. latitude, 155°03'30"W. longitude; thence to 19°44'08"N. latitude, 155°04'19"W. longitude; thence to 19°43'51"N. latitude, 155°04'30"W. longitude; thence to 19°44'10"N. latitude, 155°05'29"W. longitude; thence along the shoreline to the beginning point.

(b) Kuhio Bay. The waters of Kuhio Bay enclosed by a line beginning at 19°44'13"N. latitude, 155°03'25"W. longitude; thence to 19°44'15"N. latitude, 155°03'25"W. longitude; thence along the shoreline to the beginning point.

§110.128c Island of Kauai, Hawaii. (a) Nawiliwili Bay. The waters of Nawiliwili Bay enclosed by a line beginning at 21°57'12.5"N. latitude, 159°21'38"W. longitude; thence to 21°57'26"N. latitude, 159°21'39.5"W. longitude; thence along the shoreline to the beginning point.

§110.128d Island of Oahu, Hawaii. (a) Kaneohe Bay (1). The waters of Kaneohe Bay enclosed by a line beginning at 21°26'28"N. latitude, 157°46'00"W. longitude; thence to 21°26'00"N. latitude, 157°46'14"W. longitude; thence to 21°26'20"N. latitude, 157°47'24"W. longitude; thence to 21°27'00"N. latitude, 157°48'25"W. longitude; thence to 21°26'46"N. latitude, 157°48'37"W. longitude; thence along the shoreline to the beginning point.

(b) Kaneohe Bay (2). The waters of Kaneohe Bay enclosed by a line beginning at 21°27'28"N. latitude, 157°49'08"W. longitude; thence to 21°28'10"N. latitude, 157°50'03"W. longitude; thence to 21°29'10"N. latitude, 157°50'40"W. longitude; thence to 21°30'46"N. latitude, 157°50'14"W. longitude; thence along the shoreline to the beginning point.

(c) Keehi Lagoon. The waters of Keehi Lagoon enclosed by a line beginning at 21°19'04"N. latitude, 157°53'50"W. longitude; thence to 21°19'06"N. latitude, 157°53'44"W. longitude; thence to 21°19'37"N. latitude, 157°54'00"W. longitude; thence to 21°19'35"N. latitude, 157°54'06"W. longitude; thence to the beginning point.

(d) Sans Souci Beach. The waters of Sans Souci Beach enclosed by a line beginning at 21°15'49"N. latitude, 157°49'31"W. longitude; thence to 21°15'49.2"N. latitude, 157°49'29"W. longitude; thence to 21°15'56.2"N. latitude, 157°49'31"W. longitude; thence to 21°15'56"N. latitude, 157°49'33"W. longitude; thence to the beginning point.

(e) Iroquois Point Lagoon. The waters of Iroquois Point Lagoon enclosed by a line beginning at 21°19'53"N. latitude, 157°58'30"W. longitude; thence to 21°19'56"N. latitude, 157°58'31"W. longitude; thence along the shoreline to the beginning point.

(f) Hickam AFB Marina (1)a. The waters of Hickam AFB Marina enclosed by a line beginning at 21°19'13"N. latitude, 157°57'40"W. longitude; thence to 21°18'45"N. latitude, 157°57'40"W. longitude; thence to 21°18'45"N. latitude, 157°57'28.5"W. longitude; thence to 21°19'10"N. latitude, 157°57'28.5"W. longitude; thence along the shoreline to the beginning point.

(g) Hickam AFB Marina (2). The waters of Hickam AFB Marina enclosed by a line beginning at 21°19'11"N. latitude, 157°57'10"W. longitude; thence to 21°18'46.2"N. latitude, 157°57'20"W. longitude; thence to 21°18'46.2"N. latitude, 157°57'05.2"W. longitude; thence along the shoreline to the beginning point.

(h) Aiea Bay. The waters of Aiea Bay enclosed by a line beginning at 21°22'20"N. latitude, 157°56'30"W. longitude; thence to 21°22'27"N. latitude, 157°56'40.5"W. longitude; thence to 21°22'30"N. latitude, 157°56'40.5"W. longitude; thence to 21°22'37"N. latitude, 157°56'22.5"W. longitude; thence to 21°22'37"N. latitude, 157°56'19"W. longitude; thence along the shoreline to the beginning point.

Subpart B–Anchorage Grounds

§110.210 San Diego Harbor, Calif. (a) The anchorage grounds. The anchorage grounds for general use shall include all of the navigable waters of the harbor except cable and pipe-line areas, the special anchorage areas described in §110.90, the seaplane restricted area described in §207.612 of this chapter, and the following:

(1) Special anchorage for U.S. Government vessels. Shoreward of a line extending from Ballast Point Light approximately 351°30' to the shore end of the Quarantine Dock.

(2) (Reserved)

(3) Nonanchorage area. A lane between San Diego and Coronado bounded on the east by a line extending southerly from a point 410 feet west of United States bulkhead line Station 220 on the San Diego side of the bay to a point 350 feet west of United States bulkhead line Station 149 on the Coronado side of the bay, and on the west by a line extending due north from the intersections of the west side of "E" Avenue with the south side of First Street, Coronado, and a line extending 225° from the intersection of the west side of Pacific Highway with the north side of Harbor Drive, San Diego.

(4) (Reserved)

(5) "B" Street Merchant Vessel Anchorage. Due west from the southwest corner of the "B" Street pierhead to latitude 32°43'00", longitude 117°11'00"; thence northeasterly to latitude 32°43'20", longitude 117°10'51"; thence due east to the shoreline; thence following the shoreline and pier to the point of beginning.

Note: This anchorage is reserved for the use of merchant vessels calling at the Port of San Diego while awaiting a berth. The control of this anchorage is vested in the Port Director, Port of San Diego, Unified Port District.

(b) The regulations. (1) Vessels anchoring in portions of the harbor other than the areas excepted in paragraph (a) of this section shall leave a free passage for other craft and shall not unreasonably obstruct the approaches to the wharves in the harbor.

(2) The special anchorage described in paragraph (a) (1) of this section is reserved exclusively for the anchorage of vessels of the United States Government and of authorized harbor pilot boats. No other vessels shall anchor in this area except by special permission obtained in advance from the Commandant, Eleventh Naval District, San Diego, California.

(3) (Reserved)

(4) The area described in paragraph (a)(3) of this section is occupied by submerged pipe lines, power cables, and communication cables and is extensively used as a ferry lane by the San Diego-Coronado ferries. No vessels shall anchor in this area at any time.

§110.212 Newport Bay Harbor, Calif. (a) The anchorage grounds–(1) Temporary Anchorage C–1. Southeast of a line parallel to and 170 feet from the pierhead line at the east end of Lido Isle; north of a line parallel to and 250 feet north of a line bearing 268° from the flashing green beacon off Bay Island and passing through the beacon off 13th Street, this line being the north line of the main fairway; northwest of a line of 120 feet in length bearing 203° from the point of the pierhead line off the west end of Harbor Island; and southwest of the pierhead line off the northeast shore of Lido Isle extended.

(2) Temporary Anchorage C–2. A parallelogram-shaped area, 100 feet wide and 400 feet long, lying 100 feet bayward from and parallel to the existing pierhead line, and adjoining and on the

north side of Anchorage C-3 described in paragraph (a)(3) of this section.

(i) Vessels may anchor temporarily in Temporary Anchorages C-1 and C-2 when necessary and space permits, but shall move promptly when the necessity passes or upon order of the harbor master.

(ii) Vessels anchoring in Temporary Anchorages C-1 and C-2 shall comply with all applicable Pilot Rules, including that requiring anchor lights at night.

(iii) Floats or buoys for marking anchors or mooring in place and fixed mooring piles or stakes are prohibited.

(3) Anchorage C-3. A parallelogram-shaped area, 100 feet wide and 500 feet long, lying 100 feet bayward from and parallel to the existing pierhead line, and adjoining and on the south side of Temporary Anchorage C-2 described in paragraph (a)(2) of this section.

(i) This area is reserved for recreational and other small craft.

(ii) Fore and aft moorings will be allowed in this area conforming to Orange County Harbor Ordinance No. 490 and other local harbor regulations for recreational and small craft of such size and alignment as permitted by the harbor master.

(iii) All vessels using this area are required to maintain anchor lights from sunset to sunrise.

(b) The regulations. (1) Vessels may anchor temporarily in these areas when necessary and space permits, but shall move promptly when the necessity passes or upon order of the harbor master.

(2) Vessels anchoring in these areas shall comply with all applicable Pilot Rules, including that requiring anchor lights at night.

(3) Floats or buoys for marking anchors or moorings in place and fixed mooring piles or stakes are prohibited.

§110.214 Los Angeles and Long Beach Harbors, Calif. (a) The anchorage grounds-(1) Commercial Anchorage A (Los Angeles Harbor). An area enclosed by a line beginning at Los Angeles Light, latitude 33°42'30.8"N., longitude 118°15'02.3"W.; thence northerly to latitude 33°42'50.2"N., longitude 118°15'40.0"W.; thence along the southern edge of the Deep Channel Fairway, which is described as follows:

33°42'45.1"N., 118°16'03.9"W.
33°42'37.9"N., 118°16'08.9"W.
33°42'35.6"N., 118°16'18.9"W.
33°42'37.7"N., 118°16'23.3"W.
33°42'45.2"N., 118°16'25.7"W.
33°42'50.8"N., 118°16'35.4"W.
33°42'48.6"N., 118°16'38.4"W., thence along the eastern boundary of General Anchorage N to the San Pedro Breakwater at latitude 33°42'26.8"N., longitude 118°16'30.9"W.; thence southeasterly and easterly along the San Pedro Breakwater to the beginning point.

(i) In this anchorage the requirements of commercial ships conducting bunkering operations shall predominate.

(ii) Lightering operations are prohibited in this anchorage.

(iii) No vessel may anchor in this anchorage for a period longer than 24 hours without permission from the Captain of the Port.

(2) Commercial Anchorage B (Los Angeles and Long Beach Harbors). An area enclosed by a line beginning at the southwestern corner of Reservation Point at latitude 33°43'18.0"N., longitude 118°16'00.2"W.; thence east-southeasterly to latitude 33°43'13.8'N., longitude 118°15'51.4"W.; thence northeasterly to latitude 33°44'00.9"N., longitude 118°13'11.2"W.; thence northwesterly to the southern edge of the eastern extension of the Naval Base Mole at latitude 33°44'32.3"N., longitude 118°13'24.3"W.; thence southwesterly along the Naval Base Mole to Naval Base Mole Light 2 at latitude 33°44'25.5"N., longitude 118°13'49.0"W.; thence southwesterly to latitude 33°43'50.7"N., longitude 118°15'41.7"W.; thence west-southwesterly to Fish Harbor Channel Light 3 at latitude 33°43'48.8"N., longitude 118°15'52.7"W.; thence west-southwesterly along the southern edge of Fish Harbor west jetty until it intersects Reservation Point; thence along the eastern and southern shoreline of Reservation Point to the beginning point.

(i) In this anchorage the requirements of commercial vessels shall predominate.

(ii) Bunkering operations are permitted in this anchorage.

(iii) Lightering operations are prohibited in this anchorage.

(iv) Anchorage B may be used by any vessel granted an extended anchorage permit in accordance with paragraph (b)(6) of this section.

(v) Each vessel in this anchorage shall be anchored in such a position as not to interfere with the free navigation of the Fish Harbor Channel.

(3) Commercial Anchorage C (Los Angeles and Long Beach Harbors). An area enclosed by a line beginning at Los Angeles Main Channel Light 2, latitude 33°42'38.8"N., longitude 118°14'37.5"W.; thence northwesterly to the southernmost point of Commercial Anchorage B, latitude 33°43'13.8"N., longitude 118°15'51.4"W.; thence northeasterly to latitude 33°44'12.1"N., longitude 118°12'32.3"W.; thence southeasterly to Long Beach Channel Entrance Light, latitude 33°43'23.5"N., longitude 118°11'09.4"W.; thence westerly along the Middle Breakwater to the beginning point.

(i) In this anchorage the requirements of commercial vessels shall predominate. In the eastern portion of this anchorage, within the area defined by the 18m (approximately 59 ft.) depth curve, the requirements of vessels over 244m (approximately 800 ft.) in length overall or having a draft over 12m (approximately 39 ft.) shall predominate. Each lesser draft vessel shall anchor away from this deeper portion of the anchorage so as not to interfere with the anchoring of vessels having a draft over 12m (approximately 39 ft.).

(ii) Bunkering and lightering operations are permitted in this anchorage.

(iii) In the eastern portion of this anchorage, within the area defined by the 18m (approximately 59 ft.) depth curve, no vessel may anchor for longer than 48 hours without permission from the Captain of the Port.

(4) Commercial Anchorage D (Long Beach Harbor). An area enclosed by a line beginning at Long Beach Channel Entrance Light 2 at latitude 33°43'23.5"N., longitude 118°10'46.9"W.; thence northwesterly to the southwestern point of Pier J at latitude 33°44'18.9"N., longitude 118°12'11.8"W.; thence easterly to the southeastern point of Pier J at latitude 33°44'18.6'N., longitude 118°11'06.7"W.; thence easterly to the Southwest Lighted Marker on Island Freeman at latitude 33°44'25.2"N., longitude 118°09'46.0"W.; thence southerly to the Long Beach Breakwater at latitude 33°43'23.5"N., longitude 118°09'46.4"W.; thence westerly to the beginning point.

(i) In this anchorage the requirements of commercial ships over 244m (approximately 800 ft.) shall predominate.

(ii) Bunkering and lightering operations are permitted in this anchorage.

Note.–A portion of this anchorage is within the Explosive Anchorage Area, when the explosive anchorage is activated by the Captain of the Port. (See sec. 110.214(a)(17).)

(5) Commercial Anchorage E (Long Beach Harbor). An area enclosed by a line beginning at the southeastern point of Pier J at latitude 33°44'18.6"N., longitude 118°11'06.7"W.; thence northerly along the edge of Pier J to the breakwater off the stern of the Queen Mary; thence along the breakwater off the stern of the Queen Mary to the northeast corner of the breakwater at latitude 33°45'10.0"N., longitude 118°11'12.0"W.; thence northerly to latitude 33°45'22.0"N., longitude 118°11'12.0"W.; thence northeasterly to latitude 33°45'34.1"N., longitude 118°10'39.5"W.; thence easterly along a line 460m (1,509.186 ft.) from and parallel to the Long Beach shoreline to latitude 33°44'56.1"N., longitude 118°08'10.1"W.; thence southerly to latitude 33°44'19.0"N., longitude 118°08'10.1"W.; thence westerly to the Southwest Lighted Marker on Island Chaffee at latitude 33°44'20.0"N., longitude 118°08'20.0"W.; thence westerly to the Southeast Lighted Marker on Island Freeman at latitude 33°44'23.6"N., longitude 118°09'39.1"W.; thence along the south shore to the Southwest Lighted Marker on Island Freeman at latitude 33°44'25.2"N., longitude 118°09'46.0"W.; thence westerly to the beginning point.

(i) In this anchorage the requirements of commercial ships shall predominate.

(ii) Bunkering and lightering operations are prohibited in this anchorage.

Note.–A portion of this Anchorage is within the Explosive Anchorage Area, when the explosive anchorage is activated by the Captain of the Port. See sec. 110.214(a)(17).

(6) Commercial Anchorage F (Outside of Long Beach Breakwater). The area southeast of the Long Beach Breakwater enclosed by a line beginning at latitude 33°43'05.1"N., longitude 118°07'56.2"W.; thence westerly to latitude 33°43'05.1"N., longitude 118°10'33.5"W.; thence southeasterly to latitude 33°40'23.3"N., longitude 118°08'32.5"W.; thence easterly to latitude 33°40'23.3"N., longitude 118°06'00.0"W.; thence to the beginning point.

(i) In this anchorage the requirements of commercial ships over 244m (approximately 800 ft.) in length overall or having a draft over 12 meters (approximately 39 ft.) shall predominate.

(ii) Bunkering and lightering operations are prohibited in this anchorage.

Note.–A portion of this anchorage is within the Explosive Anchorage Area, when the explosive anchorage is activated by the Captain of the Port. (See sec. 110.214(a)(17).)

(7) Commercial Anchorage G (Outside of the Middle Breakwater). The area south of the middle breakwater enclosed by a line beginning at latitude 33°43'05.3"N., longitude 118°11'15.3"W.; thence westerly to latitude 33°43'05.3"N., longitude 118°12'15.7"W.; thence southwesterly parallel to the breakwater to latitude 33°42'25.9"N., longitude 118°14'16.0"W.; thence southeasterly to latitude 33°41'40.5"N., longitude 118°13'02.0"W.; thence northeasterly to latitude 33°42'08.6"N., longitude 118°11'33.8"W.; thence to the beginning point.

(i) In this anchorage the requirements of commercial ships shall predominate.

(ii) Bunkering and lightering operations are prohibited in this anchorage.

(iii) No vessel may enter this anchorage ground unless it is to be anchored in this area.

(8) Naval Anchorage J (Long Beach Harbor). An area enclosed by a line beginning at Naval Base Mole Light 5, latitude 33°44'40.0"N., longitude 118°12'59.8"W.; thence west-southwest along the southerly edge of the Naval Base Mole to latitude 33°44'32.3"N., longitude 118°13'24.3"W.; thence southeasterly along a line perpendicular to the Naval Base Mole which is the eastern boundary of Commercial Anchorage B to the northern boundary of Commercial Anchorage C at latitude 33°44'00.9"N., longitude 118°13'11.2"W.; thence northeasterly along the northern boundary of Commercial Anchorage C until that line intersects the western edge of the Long Beach Channel at latitude 33°44'12.1"N., longitude 118°12'32.3"W.; thence northwesterly along the western edge of the Long Beach Channel to the beginning point.

(i) In this anchorage the requirements of the U.S. Navy shall predominate.

(ii) No recreational or commercial vessel may anchor in this anchorage without first obtaining permission from the Captain of the Port.

(iii) Bunkering and lightering operations are prohibited in this anchorage.

(9) Naval Anchorage K (Long Beach Harbor). An area enclosed by a line beginning at Long Beach Breakwater East End Light, latitude 33°43'23.5"N., longitude 118°08'10.0"W.; thence northerly to latitude 33°44'19.0"N., longitude 118°08'10.1"W.; thence westerly to the Southwest

Lighted Marker on Island Chaffee at latitude 33°44′20.0″N., longitude 118°08′20.0″W.; thence westerly to the Southeast Lighted Marker on Island Freeman at latitude 33°44′23.6″N., longitude 118°09′39.1″W.; thence along the southern shore to the Southwest Lighted Marker on Island Freeman at latitude 33°44′25.2″N., longitude 118°09′46.0″W.; thence southerly to the Long Beach Breakwater at latitude 33°43′23.5″N., longitude 118°09′46.4″W.; thence easterly along the Long Beach Breakwater to the beginning point.

(i) In this anchorage the requirements of the U.S. Navy shall predominate.

(ii) No recreational or commercial vessel may anchor in this anchorage without first obtaining permission from the Captain of the Port. When granting permission, preference will be given to the requirements of vessels over 244m (approximately 800 ft.) in length.

(iii) Bunkering operations are permitted in this anchorage.

(iv) Lightering operations are prohibited in this anchorage.

(v) This anchorage may be designated an explosive anchorage. See sec. 110.214(a)(17).

(10) General Anchorage N (Los Angeles Harbor). An area enclosed by a line beginning at latitude 33°43′04.0″N., longitude 118°16′44.4″W.; thence southerly to the San Pedro Breakwater at latitude 33°42′26.8″N., longitude 118°16′30.9″W.; thence along the San Pedro shoreline to the beginning point.

(i) In this anchorage the requirements of recreational and other small craft shall predominate.

(ii) Anchoring, mooring, and recreational boating activities conforming to applicable City of Los Angeles ordinances and regulations adopted pursuant thereto are allowed in this anchorage.

(11) General Anchorage O (Los Angeles and Long Beach Harbor). An area enclosed by a line beginning at the Naval Base Mole Light 2, latitude 33°44′25.5″N., longitude 118°13′49.0″W.; thence southwesterly along the northern boundary of Commercial Anchorage B to latitude 33°43′50.7″N., longitude 118°15′41.7″W.; thence along the Terminal Island shoreline to the northwest corner of Nonanchorage U at latitude 33°44′19.2″N., longitude 118°15′25.2″W.; thence along the seaward boundary of Nonanchorage U to the shoreline at latitude 33°44′22.0″N., longitude 118°15′19.1″W.; thence along the Terminal Island shoreline to the beginning point.

(i) No recreational or commercial vessel may anchor in this anchorage without first obtaining permission from the Captain of the Port.

(ii) Bunkering and lightering operations are prohibited in this anchorage.

(iii) When necessary, this anchorage shall be reserved for vessels under the custody of the United States.

(12) General Anchorage P (Long Beach Harbor). Mouth of the Los Angeles River. The water area extending westward and northward to the head of navigation from a line drawn northward to the shore from the northeasterly corner of Pier J at latitude 33°45′10.0″N., longitude 118°11′12.0″W.

(i) In this anchorage the requirements of recreational and other small craft shall predominate.

(ii) Anchoring, mooring and recreational boating activities conforming to applicable City of Long Beach ordinances and regulations adopted pursuant thereto are allowed in this anchorage.

(iii) A 140m (approximately 459 ft.) fairway channel from the easterly boundary of this anchorage to the Navy Landing and Marina shall be maintained free of moorings and other obstructions at all times. Points of the fairway are as follows:

33°45′10.0″N., 118°11′12.0″W.
33°45′15.9″N., 118°11′12.0″W.
33°45′40.8″N., 118°11′54.6″W.
33°45′47.2″N., 118°12′08.0″W.

(13) General Anchorage Q (Long Beach Harbor/Alamitos Bay/Anaheim Bay). Beginning at the northeastern corner of Commercial Anchorage E at latitude 33°44′56.1″N., longitude 118°08′10.1″W.; thence southeasterly to the northwestern corner of Nonanchorage W at latitude 33°44′20.6″N., longitude 118°07′28.5″W.; thence along the southern boundary of Nonanchorage W (a semicircle with a 460m (approximately 1,509 ft.) radius that is centered midchannel on a line between Alamitos Bay West Jetty Light 1 and Alamitos Bay Jetty Light 2) to latitude 33°44′04.6″N., longitude 118°06′58.2″W.; thence northwesterly to Alamitos Bay East Jetty Light 2, latitude 33°44′11.3″N., longitude 118°07′09.8″W.; thence northeasterly along the eastern edge of the Alamitos Bay East Jetty 460m (approximately 1,509 ft.) to latitude 33°44′23.9″N., longitude 118°07′01.1″W.; thence easterly to the southernmost point of the east bank of the San Gabriel River at latitude 33°44′22.8″N., longitude 118°06′53.7″W.; thence along the southern shoreline of Seal Beach until the shoreline intersects the Anaheim Bay West Jetty; thence along the western edge of the Anaheim Bay West Jetty to the Anaheim Bay Light 5, latitude 33°43′39.1″N., longitude 118°06′03.3″W.; thence westerly to the southeast corner of Nonanchorage V at latitude 33°43′27.3″N., longitude 118°07′36.8″W.; thence northwesterly to the northeast corner of Nonanchorage V at latitude 33°43′38.4″N., longitude 118°07′45.5″W.; thence westerly to the northwest corner of Nonanchorage V at latitude 33°43′38.4″N., longitude 118°08′10.1″W.; thence to the beginning point.

(i) Bunkering and lightering operations are prohibited in this anchorage.

Note.–A portion of this anchorage is within the Explosive Anchorage Area, when the explosive anchorage is activated by the Captain of the Port. (See §110.214(a)(17).)

(14) Nonanchorage U (Los Angeles Harbor). An area enclosed by a line beginning at latitude 33°44′19.2″N., longitude 118°15′25.2″W.; thence south to latitude 33°44′12.8″N., longitude 118°15′22.0″W.; thence easterly to latitude 33°44′15.3″N., longitude 118°15′15.6″W.; thence northerly to latitude 33°44′22.0″N., longitude

118°15'19.1"W.; thence along the Terminal Island shoreline to the beginning point.

(i) No vessel may anchor or moor in this anchorage.

(ii) Dragging, seining, fishing operations, and other activities which might foul underwater installations within this nonanchorage area are prohibited.

Note.–This nonanchorage is established for protection of a submerged outfall of sewer pipeline.

(15) Nonanchorage V (Long Beach Harbor). An area enclosed by a line beginning at Long Beach Breakwater East End Light, latitude 33°43'23.5"N., longitude 118°08'10.1"W.; thence northerly to latitude 33°43'38.4"N., longitude 118°08'10.1"W.; thence easterly to latitude 33°43'38.4"N., longitude 118°07'45.5"W.; thence southeasterly to latitude 33°43'27.3"N., longitude 118°07'36.8"W.; thence to the beginning point.

(i) No vessel may anchor or moor in this nonanchorage.

(ii) Dragging, seining, fishing operations, and other activities which might foul underwater installations within this nonanchorage are prohibited.

Note.–This nonanchorage is established for protection of a submerged pipeline.

(16) Nonanchorage W (Mouth of Entrance Channel to Alamitos Bay). Nonanchorage Area W is a semicircle with a 460m (approximately 1,509 ft.) radius that is centered at midchannel on a line between Alamitos Bay West Jetty Light 1 and Alamitos Bay East Jetty Light 2 and which extends seaward from that line.

(i) No vessel may anchor or moor in this nonanchorage.

(17) Explosives Anchorage (Long Beach Harbor). A circular area with its center at latitude 33°43'37.0"N., longitude 118°09'02.5"W., and a radius of 1,745m (approximately 5,725 ft.).

(i) No vessel containing more than 680 metric tons (approximately 749 tons) of explosives may anchor in this anchorage.

(ii) Each anchored vessel loading, unloading, or laden with explosives, must display a red flag of at least 1.2 square meters (approximately 16 square feet) in size by day, and at night the flag must be illuminated by spotlight.

(iii) When a vessel displaying the signal required by §110.214(a) (17)(ii) occupies the Explosives Anchorage, no other vessel may anchor within the Explosives Anchorage.

Note.–When the Explosives Anchorage is activated, Anchorage K and portions of Anchorage D, E, F, and Q are encompassed by the Explosives Anchorage.

(b) General Regulations. (1) Within Los Angeles and Long Beach Harbors and the U.S. navigable waters of the Los Angeles-Long Beach Precautionary Zone, anchoring is prohibited outside of designated anchorages except:

(i) In cases of emergency; or

(ii) Unless specific permission is obtained from the Captain of the Port to anchor outside of a designated anchorage.

(2) When, due to an emergency, a vessel is anchored outside of a designated anchorage the master or person in charge of the vessel shall:

(i) Position the vessel so that it does not interfere with or endanger any facility or other vessel:

(ii) Notify the Captain of the Port of the location of and reason for emergency anchoring; and

(iii) Move the vessel as soon as the emergency is over.

(3) Upon anchoring within and departure from an anchorage the master or person in charge of a vessel shall notify the Captain of the Port by the most expeditious means.

Note.–The Captain of the Port guards VHF-FM Channel 16 (156.8 MHz).

(4) The master or person in charge of each anchored vessel unable to get underway within 4 hours shall:

(i) Notify the Captain of the Port by the most expeditious means; and

(ii) Ensure a second anchor is backed out and ready for use.

(5) The Captain of the Port may require a vessel in an anchorage to have a watchman on board at all times.

(6) Except as otherwise prescribed in this section, no vessel may occupy an anchorage inside of the San Pedro-Long Beach Breakwater for more than 10 consecutive days unless an extended anchorage permit is granted by the Captain of the Port. In determining whether an extended anchorage permit will be granted, consideration will be given, but not limited, to the current and anticipated demand for anchorage space within the harbor, the length of time requested and the reason for the request.

Note.–Commercial Anchorages A and C have additional time restrictions. (See §110.214(a)(1)(iii) and §110.214(a)(3)(iii).)

(7) The Captain of the Port may permit vessels to anchor in channels. Permission is not necessary for vessels engaged on works of river and harbor improvement under the supervision of the District Engineer, Corps of Engineers, if the District Engineer has notified the Captain of the Port in advance of all such proposed work.

(8) No vessel may be anchored so that it will swing within 60m (approximately 197 ft.) of any permanent improvements except in an emergency.

(9) No anchor may be placed outside the anchorages, nor may any vessel be so anchored that any portion of its hull or rigging extends outside the boundaries of the anchorages.

(10) No vessel may be anchored in any anchorage in such a manner as to interfere with the use of an authorized mooring buoy.

(11) The master or person in charge of each vessel to be lightered shall notify the Captain of the Port by the most expeditious means when the lightering vessel arrives alongside and again when the lightering vessel departs.

Note.–The Captain of the Port guards VHF-FM Channel 16 (156.8 MHz).

(12) No vessel while carrying, loading, or un-

loading explosives; in accordance with 46 CFR 146.29-13; or cargoes of particular hazard as listed in 33 CFR 126.10, may be anchored in an anchorage without permission from the Captain of the Port.

Note.–In granting such permission, the Captain of the Port will be guided by the current and future activities in the harbors and safety problems relating to such anchorage. The Captain of the Port will advise the Port of Long Beach Authorities and the Port of Los Angeles Authorities of anchorage assignments under the following conditions:

(i) Cargoes of Particular Hazard as defined in 33 CFR 126.10, any amount.

(ii) Explosives, Class "B" (as defined in 49 CFR 173.88), in excess of 1 net ton at any one time.

(iii) Explosives, Class "C" (as defined in 49 CFR 173.100), in excess of 10 net tons at any one time.

(iv) Military Explosives (as defined in 46 CFR 146.29), any amount.

(13) No vessel being dismantled, or undergoing major alterations may anchor in an anchorage without permission of the Captain of the Port.

(14) The Captain of the Port may, upon request, authorize a deviation from any rule in this section if that officer determines the proposed operations can be done safely.

(15) Nothing in this section may be construed as relieving any vessel from the penalties of law for obstructing navigation or for not complying with the navigation laws or any other laws or regulations.

§110.215 Anaheim Bay Harbor, Calif., U.S. Naval Weapons Station, Seal Beach, Calif.; naval explosives anchorage. (a) The anchorage ground. The waters of Anaheim Bay Harbor lying between the east side of the entrance channel and the east jetty, basically outlined as follows:

33°44'03"N., 118°05'35"W.
33°43'53"N., 118°05'15"W.
33°43'49"N., 118°05'18"W.
33°43'36"N., 118°05'56"W.
33°43'37"N., 118°05'58"W.
33°44'03"N., 118°05'35"W.

(b) The regulations. (1) This area is reserved for use of naval vessels carrying or transferring ammunition or explosives under standard military restrictions as established by the Safety Manual, Armed Services Explosives Board.

(2) No pleasure or commercial craft shall navigate or anchor within this area at any time without first obtaining permission from the Commanding Officer, Naval Weapons Station, Seal Beach, California. This Officer will extend full cooperation relating to the public use of the area and will fully consider every reasonable request for the passage of small craft in light of requirements for national security and safety of persons and property.

(3) Nothing in this section shall be construed as relieving the owner or operator of any vessel from the regulations, contained in §204.195 of this chapter, covering navigation in Anaheim Bay Harbor.

(4) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Weapons Station, Seal Beach, California, and by such agencies as may be designated by the Commandant, Eleventh Naval District, San Diego, California.

§110.216 Pacific Ocean at Santa Catalina Island, Calif. (a) The anchorage grounds–(1) Descanso Bay. Shoreward of a line connecting the promontories known as White Rock and Casino Point.

(2) Isthmus Cove. All waters shoreward of a line connecting the promontories known as Lion Head and Blue Cavern Point, excluding the following-described nonanchor area: An area 300 feet wide (170 feet west and 130 feet east of the centerline of the Catalina Island Steamship Line pier), extending 1,600 feet from the root of the pier, and an area 150 feet seaward of the shore line extending approximately 1,500 feet east and 1,500 feet northwest of the centerline of said pier.

(b) The regulations. (1) The Descanso Bay anchorage is reserved for yachts and other small craft. Floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes are prohibited.

(2) The Isthmus Cove anchorage shall be available for anchorage of all types of craft. Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes are prohibited.

(3) The non-anchorage area described in paragraph (a)(2) of this section shall be used only by commercial vessels. Commercial vessels of 15 feet draft or over may anchor in this area seaward of the Catalina Island Steamship Line pier during hours between sunrise and sunset. The use of this area for anchorage is forbidden to all other craft at all times. Fixed mooring piles or stakes and floats or buoys for marking anchors or moorings in place are prohibited.

(4) The instructions of the Captain of the Port requiring vessels to anchor bow and stern, or with two bow anchors, or requiring shifting the anchorage of any vessel within the anchorage grounds for the common safety or convenience, or for otherwise enforcing the regulations in this section, shall be promptly complied with by owners, masters, and persons in charge of vessels.

(5) Nothing in this section shall be construed as relieving the owner or person in charge of any vessels or plant from the penalties of law for obstructing navigation or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, or for otherwise violating law.

§110.218 Pacific Ocean at San Clemente Island, Calif.; in vicinity of Wilson Cove. (a) The anchorage grounds. Shoreward of a line beginning at a point on the beach bearing 153° true, 1,400 yards, from the flashing green light on the southeast headland at Wilson Cove; thence 62° true, 0.67 nautical mile; thence 332° true, 1.63 nautical miles; thence 241°31' true to the shore line.

(b) The regulations. (1) This area is reserved exclusively for anchorage of United State Government vessels or vessels temporarily operating under Government direction, and no vessel, except in an emergency, shall anchor in the area without first obtaining permission from the Commandant, Eleventh Naval District, or the Senior Naval Officer present who shall in turn notify the Commandant promptly.

(2) No vessel shall anchor in such a manner as to unreasonably obstruct the approach to the wharf.

§110.220 Pacific Ocean at San Nicolas Island, Calif.; restricted anchorage areas. (a) The restricted areas–(1) East area. All waters within a circle having a radius of one nautical mile centered at latitude 33°13′45″, longitude 119°25′50″ (the former position of San Nicolas Island East End Light), which point bears approximately 101°, 420 yards, from San Nicolas Island East End Light.

(2) West area. Shoreward of a line bearing 276° true from San Nicolas Island south side light a distance of six nautical miles; thence to a point bearing 270° true, two nautical miles, from the westernmost point of the island; thence 60° to a point due north of the northernmost point of the island; thence 180° true to the shore.

(b) The regulations. Except in an emergency, no vessel shall anchor in these restricted areas without authority of the Commandant, Eleventh Naval District. Cargo vessels destined for San Nicolas Island may anchor in the east area for unloading or loading.

§110.222 Pacific Ocean at Santa Barbara Island, Calif. (a) The anchorage grounds. Shoreward of a line beginning at the Santa Barbara Island Light on the northeast end of the island and bearing 23° true a distance of 1.515 nautical miles seaward from the beach; thence 140°30′ true, 2.54 nautical miles; thence 212°30′ true, 2.30 nautical miles; thence 296°30′ true, 0.96 nautical mile; and thence 325° true to the beach.

(b) The regulations. The anchorage shall be available for anchorage of all types of craft. Temporary floats or buoys for marking anchors in place will be permitted in this area.

§110.224 San Francisco Bay, San Pablo Bay, Carquinez Straits, Suisun Bay, San Joaquin River, and connecting waters, California. (a) San Francisco Bay Anchorage Grounds.–(1) Anchorage No. 3, General Anchorage. That portion of Belvedere Cove bounded by the shore and line beginning at latitude 37°52′20″, longitude 122°27′02″; thence southwest to latitude 37°51′43″ and longitude 122°27′25″.

(2) Anchorage No. 4, General Anchorage. (i) Bounded by the westerly shore of San Francisco North Bay and the following lines: Beginning on the shore southwest of Point San Quentin at latitude 37°56′28″, longitude 122°28′54″; thence east-southeasterly to latitude 37°55′55″, longitude 122°26′49″; thence southwesterly to latitude 37°54′13″, longitude 122°27′24″, thence southeast to the shore of Tiburon Peninsula at Point Chauncey at latitude 37°53′40.5″, longitude 122°26′55″, including Explosives Anchorage 13 and the forbidden anchorage surrounding it. For special regulations concerning the utilization of Explosives Anchorage 13 as a temporary general anchorage refer to subdivisions 110.224 (a)(10)(iv) and (v).

(ii) Special regulation: No vessel anchored in this anchorage may project into the San Francisco Bay North Channel.

(3) Anchorage No. 5, General Anchorage. (i) In San Francisco Bay beginning on the northwest shore of Red Rock at latitude 37°55′48″N., longitude 122°25′52″W.; thence west to San Francisco Bay North Channel Lighted Buoy 12 at latitude 37°55′50″N., longitude 122°26′32.4″W.; thence south to San Francisco Bay North Channel Lighted Buoy 10 at latitude 37°54′49″N., longitude 122°26′39″W.; thence southeast to latitude 37°53′23″N., longitude 122°25′09″W.; thence north to Southampton Shoal Light 5 at latitude 37°55′19″N., longitude 122°25′33″W.; thence to the southeast shore of Red Rock at latitude 37°55′42″N., longitude 122°25′45″W.; thence along the shoreline to the point of beginning.

(ii) Special regulation: No vessel anchored in this anchorage may project into the San Francisco Bay North Channel or the Southampton Shoal Channel.

(4) Anchorage No. 6, General Anchorage. Bounded by the easterly shore of San Francisco Bay and the following lines: Beginning at the shore of the southernmost extremity of Point Isabel at latitude 37°53′46″, longitude 122°19′19″; thence westerly along the northerly shore of Brooks Island to the jetty extending westerly therefrom; thence westerly along the jetty to its bayward end at latitude 37°54′13″, longitude 122°23′27″; thence south-southeast to latitude 37°49′53″, longitude 122°21′39″; thence southeast to latitude 37°49′32.5″, longitude 122°21′20.5″; thence east to latitude 37°49′34″, longitude 122°20′13″; thence east-southeast to latitude 37°49′30″, longitude 122°19′45.5″; thence east-northeast to the shore at Emoryville at latitude 37°50′04″, longitude 122°17′41″; excluding from this area, however, the Channel to Berkeley Marina delineated by lines joining the following points:

37°52′08″N., 122°19′07″W.
37°52′03″N., 122°19′17.5″W.
37°52′00″N., 122°19′15.5″W.
37°51′01″N., 122°22′07″W.
37°50′43″N., 122°22′00″W.
37°50′53″N., 122°21′32″W.
37°51′47″N., 122°18′59″W.

(5) Anchorage No. 7, Temporary General Anchorage.

(i) In San Francisco Bay bounded by the westerly shore of Treasure Island and the following lines: Beginning at the most westerly shore of Treasure Island at latitude 37°49′36″, longitude 122°22′40″; thence northwesterly to latitude 37°50′00″, longitude 122°22′57″; thence westerly to San Francisco Bay North Channel Lighted Buoy 2 at latitude 37°50′00″, longitude 122°23′44″; thence southerly to latitude 37°49′22.5″, longitude 122°23′44″;

thence southeasterly to latitude 37°48'40.5", longitude 122°22'38"; thence to the shore of Treasure Island at latitude 37°48'51.1", longitude 122°22'13".

(ii) Special regulations: (a) No vessel anchored in this anchorage may project into the San Francisco Bay North or South Channel.

(b) This anchorage is primarily for use by vessels requiring a temporary anchorage waiting to proceed to pier facilities or other anchorage grounds. This anchorage shall not be utilized by vessels for the purpose of off loading any dangerous cargoes or combustible liquids without a written permit from the Captain of the Port.

(c) Vessels utilizing this anchorage shall not remain for more than 12 hours without a written permit from the Captain of the Port.

(d) The master of every vessel using this anchorage shall maintain his vessel in such condition that the vessel can move within 1 hour upon notification by the Captain of the Port.

(e) Light draft vessels shall anchor away from the deeper portions of this anchorage in accordance with paragraph (g)(7) of this section.

(6) Anchorage No. 8, General Anchorage. (i) In San Francisco Bay bounded by the westerly shore of the Naval Air Station, Alameda, and the following lines: Beginning at Oakland Inner Harbor Light 2 at latitude 37°47'52", longitude 122°19'54"; thence west northwesterly to latitude 37°48'03", longitude 122°20'57.5"; thence south southwesterly to latitude 37°47'56", longitude 122°21'22.5"; thence southwesterly to latitude 37°47'26", longitude 122°21'41"; thence south southeasterly to latitude 37°47'00", longitude 122°21'30"; thence southeasterly to the Alameda Naval Air Station Channel Lighted Bell Buoy 1 at latitude 37°46'38", longitude 122°20'24"; thence easterly to latitude 37°46'37", longitude 122°19'56" thence northerly to the shore of the Naval Air Station, Alameda, at latitude 37°46'57", longitude 122°19'52.5".

(ii)(a) No vessel anchored in this anchorage may project into the San Francisco Bay South Channel.

(7) Anchorage No. 9, General Anchorage. (i) In San Francisco Bay bounded on the north by the shore, the breakwater and turning basin at the Alameda Naval Air Station and a line beginning at the Alameda Naval Air Station Channel Lighted Buoy 6 at latitude 37°46'23", longitude 122°19'02"; thence west to the Alameda Naval Air Station Channel Entrance Lighted Buoy 2 at latitude 37°46'27", longitude 122°20'24.5"; thence west southwesterly to latitude 37°46'08", longitude 122°21'45"; thence south southeasterly to San Bruno Shoal Channel Light 1 at latitude 37°41'44", longitude 122°20'17.5"; thence south southeast to San Bruno Shoal Channel Light 5 at latitude 37°38'37", longitude 122°18'43"; thence southeast to latitude 37°36'05"; longitude 122°14'13.5"; thence east northeast to the shore at latitude 37°37'38.5", longitude 122°09'02"; and bounded on the east by the shore; including all of San Leandro Bay excluding the pipeline areas therein. When Explosives Anchorage No. 12 is activated by the Captain of the Port, this anchorage and the forbidden anchorage zone surrounding it are excluded from Anchorage No. 9, General Anchorage.

(ii) Special regulations: (a) Light draft vessels shall anchor away from the deeper portions of this anchorage in accordance with paragraph (g)(7) of this section.

(b) No vessel anchored in this anchorage may project into the San Francisco Bay South Channel or into San Bruno Shoal Channel.

(8) Anchorage No. 10, Naval Anchorage. (i) In San Francisco Bay bounded by the easterly shore of Sausalito and the following lines: Beginning on the shore of Sausalito at latitude 37°51'20", longitude 122°28'38"; thence southeast to latitude 37°50'57.5", longitude 122°27'57"; thence southwest to the shore of Sausalito at latitude 37°50'36", longitude 122°28'34".

(ii) Special regulation: This anchorage is for the use of public vessels of the United States, but may be used by yachts when not required for use by public vessels. All yachts making use of this anchorage shall be prepared to move immediately upon notice should the anchorage be required for public vessels. With the permission of the Captain of the Port, permanent yacht moorings may be placed within this anchorage, not more than 300 yards from the shore.

(9) Anchorage No. 12, Explosives Anchorage. (i) In San Francisco Bay east of the city of San Francisco a circular area having a radius of 500 yards centered at latitude 37°44'32.5", longitude 122°20'27.5".

(ii) Special regulations: (a) No vessel may use this anchorage except the vessel that is loaded with, loading, or unloading explosives and lighters and barges lying alongside that vessel for transfer of cargo.

(b) This anchorage and the surrounding forbidden anchorage zone are temporarily activated as needed, by the Captain of the Port. When this anchorage is not activated it is part of Anchorage No. 9, General Anchorage. Notification of activation and deactivation will be disseminated by the U.S. Coast Guard in "Local Notice to Mariners," and by direct notice to the various pilot and shipping organizations.

(c) The maximum total quantity of explosives that may be on board a vessel moored in this anchorage shall be limited to 3,000 tons.

(d) The 667-yard-wide area surrounding this anchorage is a forbidden anchorage zone. No vessel may anchor in this forbidden zone while this anchorage is activated.

(10) Anchorage No. 13, Explosives Anchorage (Temporary General). (i) In San Francisco Bay east of the Tiburon Peninsula a circular area having a radius of 333 yards centered at latitude 37°55'26", longitude 122°27'27".

(ii) Special regulations: (a) No vessel may use this anchorage except the vessel that is loaded with, loading, or unloading explosives and lighters and barges lying alongside that vessel for transfer of cargo.

(b) The maximum total quantity of explosives that may be on board a vessel moored in this anchorage shall be limited to 50 tons; except that, with the permission of the Captain of the Port, vessels in transit, loaded with explosives in excess of this limitation, may anchor temporarily in this anchorage provided the hatches to the holds containing explosives are not opened.

(c) The 667-yard-wide zone partially surrounding this anchorage is a forbidden anchorage zone. No vessel may anchor in this forbidden zone while this anchorage is being utilized by an explosives laden vessel.

(d) This anchorage and the surrounding forbidden anchorage zone are temporarily activated as needed by the Captain of the Port. When this anchorage is not in use as an explosives anchorage it may be utilized by any vessel as a temporary general anchoring ground, provided oral permission of the Captain of the Port is obtained prior to usage.

(e) The master of every vessel using this anchorage shall maintain his vessel in such condition that the vessel can move within 1 hour upon notification by the Captain of the Port.

(f) No vessel anchored in this anchorage may project into the San Francisco Bay North Channel.

(11) Anchorage No. 14, Explosives Anchorage. (i) In San Francisco Bay east of Hunters Point an area 1,000 yards wide and 2,760 yards long, the end boundaries of which are semicircles, with radii of 500 yards and center, respectively at latitude 37°42′52″N., longitude 122°19′32.5″W., and latitude 37°42′14″N., longitude 122°18′47″W.; and the side boundaries which are parallel tangents joining the semicircles.

(ii) Special Regulations: (a) No vessel may use this anchorage except vessels loaded with, loading, or unloading explosives and lighters and barges lying alongside those vessels for transfer of cargo.

(b) The maximum total quantity of explosives that may be on board a vessel moored in this anchorage shall be limited to 3,000 tons. Vessels will be assigned berths in this anchorage by the Captain of the Port on the basis of the maximum quantity of explosives that will be on board the vessel.

(c) The 667-yard-wide area surrounding this anchorage is a forbidden anchorage zone. No vessel may anchor in this forbidden zone while this anchorage is activated.

(d) This anchorage and the surrounding forbidden anchorage zone may be temporarily discontinued by the Captain of the Port when the area is required for general anchorage purposes.

(b) San Pablo Bay Anchorage Grounds.–(1) Anchorage No. 18, General Anchorage. In San Pablo Bay bounded by the westerly shore of San Pablo Bay and the following lines: Beginning at the shore at Point San Pedro at latitude 37°59′16″, longitude 122°26′47″; thence east to latitude 37°59′16″, longitude 122°26′26″; thence northerly to latitude 38°03′46″, longitude 122°25′52.5″; thence northwesterly to the shore south of the entrance to Novato Creek at latitude 38°05′13.5″, longitude 122°29′04″; excluding from this area, however, the channel to Hamilton Field and the extension of this channel easterly to the boundary of the anchorage, and the pipeline area therein.

(2) Anchorage No. 19, General Anchorage. In San Pablo Bay bounded by the northeasterly shore of San Pablo Bay and the following lines: Beginning at the shore of Tubbs Island at latitude 38°07′39″, longitude 122°25′18″; thence southerly to latitude 38°00′36″, longitude 122°25′20″; thence northeasterly to latitude 38°03′13″, longitude 122°19′46″; thence east northeasterly to latitude 38°03′37″, longitude 122°17′13″; thence northerly to the long dike extending southwesterly from Mare Island at latitude 38°03′52.5″, longitude 122°17′10″; thence along the long dike to the shore at Mare Island. Vessels anchored in this anchorage shall insure that they do not project into the Pinole Shoal Channel.

Note: See §204.215 of this title establishing a target area in San Pablo Bay adjacent to the westerly shore of Mare Island for use of the Mare Island Navy Yard.

(3) Anchorage No. 20, General Anchorage. In San Pablo Bay bounded by the southeasterly shore of San Pablo Bay and the following lines: Beginning at the northeast corner of Parr Terminal No. 4 at Point San Pablo at latitude 37°57′59″, longitude 122°25′35″; thence northeast to latitude 38°01′27.5″, longitude 122°21′33″; thence east-northeast to the Union Oil Co. pier at Oleum at latitude 38°03′18″, longitude 122°15′37″; and thence along this pier to the shore.

(4) Anchorage No. 21, Naval Anchorage. In San Pablo Bay south of Mare Island a rectangular area beginning at latitude 38°03′56″, longitude 122°15′56″; thence easterly to latitude 38°04′02″, longitude 122°15′20″; thence southerly to latitude 38°03′48″, longitude 122°15′16″; thence westerly to latitude 38°03′42″, longitude 122°15′52″; thence northerly to the point of beginning.

(c) Carquinez Strait Anchorage Grounds–(1) Anchorage No. 24, General Anchorage. (i) Bounded by the northerly shore of Carquinez Strait and the following lines: Beginning on the shore at Dillon Point at latitude 38°03′44″, longitude 122°11′29″; thence southeast to latitude 38°03′34″, longitude 122°11′10″; thence south-southeast to latitude 38°03′17″, longitude 122°11′04″; thence southeast to the shore of Benicia at latitude 38°02′37.5″, longitude 122°09′55″.

(ii) Special regulation: Each vessel anchoring in this anchorage shall promptly notify the Captain of the Port, upon anchoring and upon departure.

(2) Anchorage No. 25, General Anchorage. (i) Bounded by the south shore of Carquinez Strait and the following lines: Beginning on the shore at Point Carquinez at latitude 38°02′09″, longitude 122°10′22″; thence east southeast to latitude 38°01′47″, longitude 122°08′57″; thence southeast to the shore of Martinez at latitude 38°01′20″, longitude 122°08′42″.

(ii) Special regulation: Each vessel anchoring in this anchorage shall promptly notify the Captain of the Port, upon anchoring and upon departure.

(d) Suisun Bay Anchorage Grounds.–(1) Anchorage No. 26, General Anchorage. On the west side of Suisun Bay, adjacent to and northeast of the city of Benicia within the following boundaries: Beginning on the shore northeast of Army Point at latitude 38°02′54″, longitude 122°07′37″; thence south southeast along the Southern Pacific bridge to latitude 38°02′38″, longitude 122°07′24″; thence east to latitude 38°02′42″, longitude 122°07′07.5″; thence northeast to Suisun Bay Anchorage 26 Lighted Buoy B at latitude 38°05′42″, longitude 122°04′06″; thence northwest to the shore at latitude 38°05′58″, longitude 122°04′28″; thence along the shore to the point of beginning.

Note: A portion of Anchorage 26 is occupied by the Suisun Bay Reserve Fleet of the Maritime Administration and §162.270 of this title establishes a restricted area in the vicinity of the Reserve Fleet.

(2) Anchorage No. 27, General Anchorage. In the northeast portion of Suisun Bay bounded by the northern shore and the following lines: Beginning on the shore of Grizzly Island at latitude 38°08′13″, longitude 122°02′42.5″; thence south to tripod at Preston Point on Roe Island at latitude 38°04′16″, longitude 122°02′42″; thence along the south shore of Roe Island to latitude 38°04′05″, longitude 122°01′35″; thence east southeast to latitude 38°03′42.5″, longitude 121°58′54″; thence east to the shore of Chipps Island at latitude 38°03′42.5″, longitude 121°55′05″.

(e) San Joaquin River Anchorage Grounds.–(1) Anchorage No. 28, General Anchorage. The area bounded on the east by the shore of Lower Sherman Island and the following lines: Beginning at Point Sacramento on Lower Sherman Island at latitude 38°03′45″, longitude 121°50′17.5″; thence southwest to latitude 38°03′37.5″, longitude 121°50′31″; thence south-southeast to latitude 38°02′11″, longitude 121°49′58″; thence to the shore of Lower Sherman Island at latitude 38°02′23″, longitude 121°49′49″.

(2) Anchorage No. 30, Explosives Anchorage. (i) The portion of the Old San Joaquin River Channel bounded on the west by the shore of Mandeville Point and the following lines: Beginning on the shore of Mandeville Point at latitude 38°04′01″, longitude 121°32′05″; thence northeast to latitude 38°04′07.5″, longitude 121°31′58″; thence southeast to latitude 38°03′47″, longitude 121°31′42.5″; thence west to the shore of Mandeville Point at latitude 38°03′47.5″, longitude 121°31′56″.

(ii) Special regulations: (a) This anchorage is for the use of vessels, lighters, and barges loaded with, loading, or unloading explosives or explosive materials.

(b) No other vessel may enter or remain in this anchorage when the anchorage is occupied by vessels loaded with explosives. At all other times the anchorage is open to navigation.

(c) Notice of loading and unloading operations will be given by notice published by the U.S. Coast Guard in "Local Notice to Mariners", and by notice given by the Port of Stockton to local radio stations and newspapers, and by telephonic means to any organization that may request that such advice be given. In all cases the notice will state how long the operation will be in progress and on what days.

(f) Sacramento River, Decker Island Restricted Anchorage for Vessels of the U.S. Government.–(1) The anchorage ground. An elongated area in the Sacramento River bounded on the west by the shore of Decker Island and the following lines: Beginning on the shore at Decker Island North End Light at latitude 38°06′16″, longitude 121°42′32.5″; thence east to latitude 38°06′15″, longitude 121°42′27″; thence south to latitude 38°05′22″, longitude 121°42′30″; thence southwest to latitude 38°05′08″, longitude 121°42′40″; thence west southwest to latitude 38°05′02″, longitude 121°42′50″; thence northwest to the shore of Decker Island at latitude 38°05′04″, longitude 121°42′52.5″.

(2) Special regulation. No vessel or other craft except those owned by or operating under contract with the United States may navigate or anchor within 50 feet of any moored Government vessel in the area. Commercial and pleasure craft shall not moor to buoys or chains of Government vessels, nor may they, while moored or underway, unreasonably obstruct the passage of Government or other vessels through the area.

(g) General regulations. The following regulations apply to each anchorage described in this section;

(1) No vessel may anchor in the navigable waters of San Francisco Bay, San Pablo Bay, Carquinez Strait, Suisun Bay, New York Slough, San Joaquin River Deep Water Channel, and the Stockton Turning Basin, Calif., outside of the anchorage areas established in this section except when unforeseen circumstances create conditions of imminent peril or with the written permission of the Captain of the Port. Each vessel anchoring in imminent peril or heavy fog shall immediately inform the Captain of the Port of her position and reason for anchoring.

(2) No vessel may anchor within a tunnel, cable, or pipeline area shown on a Government chart.

(3) No vessel may moor, anchor, or tie up to any pier, wharf, or other vessel in such a manner as to extend into a channel.

(4) No vessel in such a condition that it is likely to sink or otherwise become a menace or obstruction to navigation or anchorage of other vessels may occupy an anchorage, except when unforeseen circumstances create conditions of imminent peril to personnel and then only for such period as may be authorized by the Captain of the Port.

(5) The Captain of the Port may require any vessel in a designated anchorage area to moor with two or more anchors.

(6) Each vessel that will not have sufficient personnel on board to weigh anchor at any time shall anchor with two anchors with mooring swivel, unless otherwise authorized by the Captain of the Port.

(7) Deep-draft vessels will take precedence over

vessels of lighter draft in the deeper portions of all anchorages. Light-draft barges and vessels shall anchor away from the deeper portions of the anchorage so as not to interfere with the anchoring of deep-draft vessels. Should circumstances warrant, the Captain of the Port will require lighter draft vessels to move to provide safe anchorage, particularly in Anchorages 7 and 9, for deep-draft vessels.

(8) Barges towed in tandem to any anchorage area shall nest together when anchoring.

(9) Each vessel that is notified by the Captain of the Port or his authorized representative to shift her position shall promptly shift her position.

(10) No person may use these anchorages for any purpose other than the purpose stated in the special anchorage regulations.

(11) Nothing in this section may be construed as relieving any vessel or the owner or person in charge of any vessel from the penalties of law for obstructing or interfering with range lights or for not complying with the laws relating to lights, day signals, and fog signals and other navigation laws and regulations.

(12) Explosives anchorages. (i) Unless otherwise authorized by the Captain of the Port, no vessel other than a vessel carrying explosives may anchor in an explosives anchorage.

(ii) Each vessel carrying explosives shall be entirely within one of these areas when anchored, except as provided by paragraph (g)(12)(x) of this section.

(iii) No vessel may transport explosives to be loaded on, or that have been unloaded from, another vessel in an explosives anchorage area unless she carries written permission from the Captain of the Port.

(iv) No vessel carrying explosives or on which explosives are to be loaded may proceed to an explosives anchorage or occupy a berth in an explosives anchorage without written permission from the Captain of the Port, which may be revoked at any time.

(v) The Captain of the Port may issue permission to vessels carrying flammable solids, oxidizing materials, corrosive liquids, flammable liquids, compressed gases, and poisonous substances to occupy a berth in an explosives anchorage. Such a permit must be obtained before entering the anchorage and may be revoked at any time.

(vi) The Captain of the Port may require any person having business on board a vessel which is laden or being on-loaded or off-loaded with explosives to have a document that is acceptable to the Coast Guard for identification purposes and to show that document to the Captain of the Port.

(vii) The Captain of the Port may require a non-self-propelled vessel, or a self-propelled vessel that is unable to maneuver under its own power, that occupies an explosives anchorage to be attended by a tug.

(viii) Each vessel loading, unloading, or laden with explosives, while within an explosives anchorage, shall display by day at her masthead, or at least 10 feet above the upper deck if the vessel has no masthead, a red flag 16 square feet or more.

(ix) When a vessel is conducting loading operations from barges at any explosives anchorage and is displaying a red flag by day, passing vessels shall reduce speed so as to insure that their wake does not interfere with cargo transfer operations.

(x) The District Engineer, Corps of Engineers, may issue written permission for anchoring a single barge carrying explosives in quantities considered by him as safe and necessary in the vicinity of work being done directly under his supervision or under a Department of the Army permit. When the District Engineer issues such permission, he shall prescribe the conditions under which the explosives must be stored and handled and shall furnish a copy of the permit and a copy of the rules and regulations for storing and handling to the Captain of the Port.

(13) No vessel other than a vessel under Federal supervision may go alongside or in any manner moor to any Government-owned vessel, mooring buoy, or pontoon boom, their anchor cables, or any of their appendages. No vessel other than a vessel under Federal supervision may obstruct or interfere in any manner with the mooring, unmooring, or servicing of vessels owned by the United States.

(14) Each vessel anchoring in the San Joaquin River Deep Water Channel or the Stockton Turning Basin because of imminent peril or heavy fog shall be positioned as near the edge of the channel or turning basin as possible so as not to interfere with navigation, or obstruct the approach to any pier, wharf, slip, or boat harbor and shall move as soon as the imminent peril or heavy fog ceases or when notified to move by the Captain of the Port.

(15) No vessel may permanently moor in areas adjacent to the San Joaquin River Deep Water Channel except with the written permission of the Captain of the Port.

§110.228 Columbia River, Oreg. and Wash. (a) The anchorage grounds–(1) Lower Tongue Point Anchorage. A rectangular area bounded as follows: Beginning at latitude 46°12'07"N., longitude 123°47'24"W.; thence northwesterly to latitude 46°12'19"N., longitude 123°47'33"W.; thence northeasterly to latitude 46°12'36"N., longitude 123°46'42"W.; thence southeasterly to latitude 46°12'24"N., longitude 123°46'32"W.; thence to the point of beginning.

(2) Upper Tongue Point Anchorage. A pentagonal area bounded as follows: Beginning at latitude 46°12'24"N., longitude 123°46'32"W.; thence northwesterly to latitude 46°12'36"N., longitude 123°46'42"W.; thence northeasterly to latitude 46°12'59"N., longitude 123°46'00"W.; thence continuing northeasterly to latitude 46°13'05"N., longitude 123°45'38"W.; thence southeasterly to latitude 46°12'57"N., longitude 123°45'30"W.; thence to the point of beginning.

(b) The regulations. (1) No vessel shall anchor in anchorages described in paragraph (a)(1) and (2) of this section without prior permission from the

Captain of the Port, or his authorized representative. No vessel shall occupy either anchorage for a period longer than 30 days unless a permit is obtained from the Captain of the Port for that purpose. No vessel in a condition such that it is likely to sink or otherwise become a menace or obstruction to the navigation or anchorage of other vessels shall occupy an anchorage except in an emergency and then only for such period as may be permitted by the Captain of the Port. A berth in an anchorage, if available, shall be assigned to any vessel by the Captain of the Port upon application and he may grant revocable permits for the continuous use of the same berth.

§110.229 Straits of Juan de Fuca, Wash. (a) Anchorage grounds–(1) Nonanchorage area (Port Angeles Harbor). Beginning at a point on the shore at latitude 48°07′04.5″N., longitude 123°24′15.6″W.; thence to latitude 48°07′39.1″N., longitude 123°24′00″W.; thence to latitude 48°07′36.7″N., longitude 123°23′46″W.; thence to a point on the shoreline at latitude 48°06′57.4″N., longitude 123°24′04″W.

(b) The regulations. (1) No vessel may anchor in this nonanchorage area at any time.

(2) Dragging, seining, fishing, or other activities which may foul underwater installations within this nonanchorage area are prohibited.

(3) Vessels may transit this nonanchorage area, but must proceed by the most direct route and without unnecessary delay.

(4) The city of Port Angeles will mark this area with signs on the shoreline visible (during normal daylight) 1 mile to seaward reading "Do Not Anchor in This Area."

§110.230 Puget Sound Area, Wash. (a) The anchorage grounds–(1) Freshwater Bay emergency explosives anchorage, Strait of Juan de Fuca. All of Freshwater Bay and adjacent waters shoreward of a line beginning at Observatory Point, latitude 48°09′03″, longitude 123°38′12″, thence due north approximately 1,150 yards to latitude 48°09′36″, longitude 123°38′12″; thence 90°, approximately 6,450 yards, to latitude 48°09′36″, longitude 123°33′27″; thence 180° to the shoreline.

(i) This area does not constitute an explosives anchorage for loading or discharging explosives, but is established exclusively for use by explosives laden vessels enroute to the ammunition dumping area which encounter adverse weather and sea conditions and are forced to await more favorable conditions before proceeding to sea.

(1–a) Bellingham Bay general anchorage. The waters of Bellingham Bay within a circular area with a radius of 2,000 yards, having its center at latitude 48°44′15″, longitude 122°32′25″.

(1–b) Bellingham Bay explosives anchorage. The waters of Bellingham Bay within a circular area with a radius of 1,000 yards, having its center at latitude 48°42′48″, longitude 122°33′37″.

(2) Port Townsend explosives anchorages–(i) Fair weather anchorage area. A circular area having a radius of 300 yards, whose center is at latitude 48°06′26″, longitude 122°43′46″.

(ii) Foul weather anchorage area. A circular area having a radius of 300 yards, whose center is at latitude 48°04′05″, longitude 122°44′52″.

(3) Holmes Harbor general anchorage. All of Holmes Harbor lying southerly of a line ranging 310° through Hackney Island, between the shores of Whidbey Island.

(4) Port Gardner general anchorage, Possession Sound. Beginning at a point bearing 211°, 560 yards, from Everett Jetty Light; thence 180°, 675 yards; thence 216°, 250 yards; thence 254°, 800 yards; thence 302°, 1,700 yards; thence 49°, 1,280 yards; thence approximately 115°, 1,525 yards, to the point of beginning.

(5) (Reserved)

(6) Thorndike Bay emergency explosives anchorage, Hood Canal. Beginning at a point bearing 267°, 3,500 yards, from Hood Canal 5 Light; thence 180° 1,000 yards, to a point approximately 251°, 3,725 yards, from Hood Canal 5 Light; thence 270°, 1,350 yards, to a point approximately 256°, 5,000 yards, from Hood Canal 5 Light; thence due north 1,000 yards, to a point approximately 268°, 4,900 yards, from Hood Canal 5 Light; thence approximately 90°, 1,350 yards, to the point of beginning.

(7) Smith Cove general anchorage (west), Elliott Bay. Shoreward of a line beginning at Fourmile Rock Light; thence to a point bearing 207°, 1,100 yards, from Fourmile Rock Light; thence southeasterly to point bearing 6°30′, 2,075 yards, from Duwamish Head Light; thence due north to the shore of Smith Cove.

(8) Smith Cove general anchorage (east), Elliott Bay. Beginning at the intersection of the Federal pierhead line and a line drawn along the north side of Denny Way; thence westerly on said line 2,000 feet; thence northwesterly along a line paralleling the Federal pierhead line to its intersection with a straight line drawn along the east side of Pier 88; thence due north to the intersection with the Federal pierhead line; thence along said pierhead line to the point of beginning.

(9) Elliott Bay general anchorage (east). Shoreward of a line beginning at the northeast corner of Harbor Island; thence northerly and in a straight line to its intersection with a line drawn along the south side of King Street; thence west on said line to its intersection with the east line of West Waterway; thence along said line to the northwest corner of Harbor Island.

(10) Elliott Bay general anchorage (west). Shoreward of a line beginning at a point of intersection of the Federal pierhead line with a straight line drawn along the west line of West Waterway; thence north to a point intersecting a straight line drawn along the south side of Dearborn Street; thence in a westerly direction to the foot of West Fairmount Avenue.

(11) Orchard Point general anchorage, Puget Sound. Beginning at Orchard Point Light; thence 106°, two miles; thence 180° to the northern shore of Blake Island; thence west and south along the shoreline to the southern end of Blake Island at

approximate longitude 122°29′16″; thence 250° to the dock at Harper; thence westerly and northerly along the shoreline to the point of beginning.

(12) (Reserved)

(13) Commencement Bay general anchorage. A quadrilateral area bounded as follows: Beginning at latitude 47°17′37″N., longitude 122°26′00″W.; thence due south to latitude 47°17′19″N., longitude 122°26′00″W.; thence due east to a point bearing 286°T from Hylebos Waterway Light at a distance of 450 yards; thence due north to latitude 47°17′33″N., longitude 122°25′00″W.; thence west northwest to the point of beginning.

(14) Cherry Point general anchorage. The waters within a circular area with a radius of 0.8 nautical mile, having its center at latitude 48°48′30″N., longitude 122°46′00″W.

(b) The regulations. (1) No vessel shall anchor in any general anchorage described in paragraph (a) of this section without prior permission from the Captain of the Port, or his authorized representative. No vessel shall occupy any general anchorage for a period longer than 30 days unless a permit is obtained from the Captain of the Port for that purpose. No vessel in a condition such that it is likely to sink or otherwise become a menace or obstruction to the navigation or anchorage of other vessels shall occupy a general anchorage except in an emergency and then only for such period as may be permitted by the Captain of the Port. A berth in a general anchorage, if available, may be assigned to any vessel by the Captain of the Port upon application and he may grant revocable permits for the continuous use of the same berth.

(2) Explosive anchorages are reserved for vessels carrying explosives. All vessels carrying explosives shall be within these areas when anchored.

(3) Whenever any vessel not fitted with mechanical power, anchors in an explosive anchorage, the Captain of the Port may require the attendance of a tug upon such vessel, when, in his judgment, such action is necessary.

(4) Vessels carrying explosives shall comply with the general regulations in paragraph (b)(1) of this section, when applicable.

(5) Every vessel at anchor in an explosives anchorage shall display by day a red flag at least 16 square feet in area at its mast head or at least 10 feet above the upper deck if the vessel has no mast, and by night a red light in the same position specified for the flag. These signals shall be in addition to day signals and lights required to be shown by all vessels when at anchor.

(6) Every vessel constructed of wood shall, unless there are steel bulwarks or metallic cases or cargo on board, be fitted with radar reflector screens of metal of sufficient size to permit target indication on the radar screen of commercial type radars.

(7) Fishing and navigation by pleasure and commercial craft are prohibited within the area at all times when vessels which are anchored in the area for the purpose of loading or unloading explosives display a red flag by day and a red light by night, unless special permission is granted by the Captain of the Port.

(8) No explosives handling in any explosive anchorage will be undertaken by any vessel unless personnel from the Captain of the Port are on board to supervise the handling of explosives.

(9) No vessel shall remain at anchor in any explosive anchorage unless there is on board such vessel a competent watchman or a tug in attendance.

§ 110.235 Pacific Ocean (Mamala Bay), Honolulu Harbor, Hawaii; anchorage for nitrate laden vessels. (a) The anchorage ground. The waters of the Pacific Ocean (Mamala Bay) within an area directly offshore of Keehi Lagoon at Honolulu, Hawaii, described as follows: Beginning at a point bearing 251° true, 5,925 yards, from Honolulu Harbor Light (Aloha Tower); thence on a bearing of 202° true, 1,000 yards; thence on a bearing of 290°30′ true, 800 yards; thence on a bearing 22° true, 1,000 yards; thence on a bearing of 110°30′ true, 800 yards to point of beginning. This area provides anchorage space for one (1) vessel.

(b) The regulations. (1) Anchorage within this area shall be restricted to not more than one (1) nitrate laden vessel at any one time. Other vessels are cautioned against frequenting the area at any time, and they shall not, without specific authority from the District Commander, enter or remain in the area when a nitrate laden vessel is anchored within or is approaching the area, or anchor outside the area within 1,000 yards of a nitrate laden vessel anchored within the area.

NOTE: The term "District Commander," as used in this section, means the Commander, 14th Coast Guard District, Honolulu, Hawaii, or his duly authorized representative.

(2) Except in an emergency involving danger to life or property, no nitrate laden vessel shall anchor within the area without first obtaining permission from the District Commander. The master of a nitrate laden vessel shall notify the District Commander in advance of his intention to anchor within the area, giving the name of the vessel and the time he expects to anchor and any additional information requested such as the reason for the stopover, anticipated period of the stopover, kind and amount of cargo carried, destination, and proposed location of any necessary torches or welding anticipated, etc. The vessel shall not enter the area until permission to anchor has been received from the District Commander, and it shall then anchor along the longitudinal center line of the area 600 yards from any corner as designated by the District Commander.

(3) The master of the vessel shall request permission from the District Commander for any necessary additional stopover privilege longer than the period originally anticipated. He shall also notify the District Commander when his vessel is ready to leave the area.

(4) In addition to the appropriate day and night signals, the anchored vessel shall display by day a red flag of at least 16 square feet, and by night a

red light visible all around the horizon, at the mast head or at least 10 feet above the upper deck if the vessel has no mast.

(5) The master of the vessel shall have the vessel properly patrolled at all times, and anchor bearings carefully checked at frequent intervals. During rough seas, if he is in doubt as to being securely anchored and is without ship power he shall call for tug service from any of the commercial tug-service firms available in Honolulu Harbor. All charges incurred thereby shall be charged to the vessel owner or agent.

(6) Upon being notified to shift its position a vessel shall get under way at once or signal for a tug and change position as directed with reasonable promptness.

(7) In the event of fire on board any anchored vessel, the master or other officer in charge shall immediately sound five blasts of five seconds each of a whistle or siren, which signal may be repeated at intervals to attract attention. This signal shall be used in addition to any other means available for reporting a fire. If for any reason the whistle signal is inoperative the master shall make arrangements whereby the radio transmitter and operator will be available.

(8) Nothing in this section shall be construed as relieving the owner or person in charge of any vessel from strict compliance with all applicable navigation laws and regulations established by the Commandant of the Coast Guard with respect to explosives and other dangerous articles and substances on board vessels.

§110.236 Pacific Ocean off Barbers Point, Island of Oahu, Hawaii: Off-shore pipeline terminal anchorages. (a) The anchorage grounds.–(1) Anchorage A.–The waters within an area described as follows: A circle of 1,000 feet radius centered at latitude 21°17′55″N., longitude 158°07′46″W.

(2) Nonanchorage area A.–The waters extending 300 feet on either side of a line bearing 059° from anchorage A to the shoreline at latitude 21°18′22″N., longitude 158°06′57″W.

(3) Anchorage B.–The waters enclosed by a line beginning at latitude 21°16′31.5″N., longitude 158°05′09.0″W.; thence to latitude 21°16′03.9″N., longitude 158°05′16.9″W.; thence to latitude 21°16′11.1″N., longitude 158°05′45.8″W.; thence to latitude 21°16′38.8″N., longitude 158°05′37.9″W.; thence to the point of beginning.

(4) Nonanchorage area B.–The waters extending 300 feet on either side of a line bearing 334.5° from anchorage B to the shoreline at latitude 21°17′50.5″ N., longitude 158°06′13.1″W.

(5) Anchorage C.–The waters enclosed by a line beginning at latitude 21°16′58″N., longitude 158°04′39″W.; thence to latitude 21°16′58″N., longitude 158°04′12″W.; thence to latitude 21°16′44″N., longitude 158°04′12″W.; thenee to latitude 21°16′44″N., longitude 158°04′39″W.; thence to the point of beginning.

(6) Nonanchorage area C.–The waters extending 300 feet on either side of a line bearing 306° from anchorage C to the shoreline at latitude 21°17′54.9″N., longitude 158°06′07.8″W.

(7) Anchorage D.–The waters enclosed by a line beginning at latitude 21°18′00″N., longitude 158°07′20″W.; thence to latitude 21°17′56″N., longitude 158°07′16″W.; thence to latitude 21°17′49″N., longitude 158°07′24″W.; thence to latitude 21°17′53″N., longitude 158°07′28″W.; thence to the point of beginning.

(b) The regulations.–(1) No vessels may anchor, moor, or navigate in anchorages A, B, C, or D except–

(i) Vessels using the anchorages and their related pipelines for loading or unloading;

(ii) Commercial tugs, lighters, barges, launches, or other vessels engaged in servicing the anchorage facilities or vessels using them.

(iii) Public vessels of the United States.

(2) When vessels are conducting loading or unloading operations as indicated by the display of a red flag (international code flag B) at the masthead, passing vessels of over 100 gross tons shall not approach within 1,000 yards at a speed in excess of 6 knots.

(3) The owner of any vessel wanting to use an anchorage ground and use of the related pipeline facilities shall notify the captain of the port, Honolulu, Hawaii, and the Commanding Officer, U.S. Naval Air Station, Barbers Point, Hawaii, at least 24 hours in advance of desired occupancy of the anchorage ground by the vessel. Such notification must include the maximum height above the waterline of the uppermost portion of the vessel's mast and a description of the masts' lighting including height of the highest anchor light and any aircraft warning lights to be displayed by the vessel at night.

(4) When, in the opinion of the Captain of the Port, or his authorized representative, oil transfer operations within these anchorages could jeopardize the safety of vessels or facilities in the area, or cause an undue risk of oil pollution, such oil transfer operations shall be immediately terminated until such time as the cognizant Coast Guard officer determines that the danger has subsided.

(5) Nonanchorage areas A, B, and C are established for the protection of submerged pipelines. Except for vessels servicing pipeline facilities, no anchoring, dragging, seining or other potential pipeline fouling activities are permitted within these areas.

(6) Nothing in this section shall be construed as relieving the owner or person in charge of any vessel from complying with the rules of the road and safe navigation practice.

(7) The regulations of this section are enforced by the captain of the port or his duly authorized representative.

§110.237 Pacific Ocean at Waimea, Hawaii, Naval Anchorage. (a) The anchorage grounds. All the waters within a circle having a radius of 300 yards centered at latitude 21°57′02″N., longitude 159°41′33″W.

(b) The regulation. Except in an emergency, no vessel except a Naval vessel may anchor or moor in this anchorage without permission of the Captain of the Port, Honolulu, Hawaii.

Part 117–Drawbridge Operation Regulations

§117.1 General.(a) The operation of drawbridges, in the absence of specific regulations in this part, shall be as required by section 5 of the act of August 18, 1894, as amended (28 Stat. 362; 33 U.S.C. 499). It shall be the duty of persons owning, operating, and tending drawbridges built across navigable waters of the United States, to open, or cause to be opened, the draws of such bridges under such rules and regulations as in the opinion of the Commandant the public interests require. Insofar as criminal liability on the part of the bridge owner is concerned, the Commandant is of the opinion that, in the absence of Federal regulations, there is no Federal authority requiring the opening of any drawbridge to which the General Bridge Act of March 23, 1906, does not apply. With reference to the civil liability of the bridge owner, however, it has been held that the duty to take proper care of a bridge includes the duty to make proper provision for the passage of vessels through the draw. In constructing a bridge with a draw, and in undertaking to open and manage the draw so as to allow vessels to pass, the owner has recognized the right of vessels to pass through without any appeal to the national authority to protect that right. Having thus recognized the rights of commerce, and undertaken to provide accommodations for the passage of vessels, the owner is bound that the custodians of the bridge shall use ordinary diligence to avoid accidents to vessels going through the draw at customary hours, and in the customary manner, as one of the incidents of the care, management, and control of the bridge itself. The owner is responsible, therefor, for the want of ordinary care and diligence in his servants, and for the consequent damage.

(b) The Attorney General has held (Jan. 28, 1899; 22 Opin. 314) that the first part of section 5 of the 1894 act is merely declaratory of the legal duty of the owners or operators which attaches to the maintenance and operation of a drawbridge across navigable waters. "It is the duty of all persons operating such drawbridges to open or cause them to be opened in a reasonable manner and at a reasonable time, consistent with the uses for which drawbridges are constructed, for the passage of vessels. The repair of such draws and of the bridges with which they are connected is also necessary for their maintenance. It is reasonable that a sufficient time should be allowed for such repairs and if they cannot be prosecuted without closing the bridge for a number of successive days, such closing cannot be considered an unreasonable interference with navigation." "It is entirely competent for the Secretary of the Army to make rules and regulations governing this subject, but in the absence of such rules and regulations the law is as I have above stated it." (The Commandant prescribes these rules and regulations.)

(c) Notwithstanding any general or special regulation heretofore or hereafter prescribed, drawbridges across navigable waters of the United States will not be opened to navigation for certain periods determined by the proper civil defense authorities to be in the interest of public safety during a major disaster or civil defense emergency indicated by a civil defense condition of "Air Raid Warning" (attack by enemy aircraft probable, imminent, or taking place).

(d) (Reserved).

(e) The Commandant may require the owner or operator to install and operate one or more radiotelephone stations of appropriate characteristics on a drawbridge upon finding that for navigation or safety it is essential that a means other than sound or visual signals be available to request openings of the draw.

(1) The Commandant's determination is based on such factors as location and navigational clearance of the particular bridge, character and volume of marine traffic, configuration of the navigational channel, restrictions in channel approaches, currents in the approaches to or through the drawbridge, obstructions and conditions limiting visibility, and similar conditions affecting navigation or safety through or in the vicinity of the drawbridge.

(2) Each station shall be subject to the rules and regulations of the Federal Communications Commission or the Director of Telecommunications Management as applicable governing the assignment of operating frequencies, licensing, and operation of radiotelephone stations.

(3) When the Commandant proposes that a radiotelephone station, or stations, be installed and operated on a specific drawbridge, he gives written notice of the proposed requirement to the bridge owner (or operator as appropriate) who shall have 30 days in which to submit comments or objections to the proposal. If the Commandant determines that such installation is necessary the bridge owner (or operator) shall have a reasonable time, but normally not more than 6 months, in which to effect installation and commence operation.

(4) The provisions of this section are not intended to restrict the voluntary installation and operation of radiotelephone stations on drawbridges.

§117.1a Temporary departures from regulations in this part. (a) Temporary closures of drawbridges. Notwithstanding any general or special regulation in this part, heretofore or hereafter prescribed, a specific drawbridge across navigable waters of the United States need not be open to navigation for specified periods of time when such a bridge may be undergoing repairs or maintenance work or when the public interest, health, or safety so requires.

(b) Delegation to District Commanders. The Commandant further delegates pursuant to 49 CFR 1.4 (g) to District Commanders authority to place in effect the provisions of paragraph (a) of this section with respect to drawbridges in their respective Coast Guard Districts for periods of time determined to be necessary but in no event to exceed 60 consecutive calendar days. For a specific drawbridge the District Commander having jurisdiction may suspend any drawbridge operation regulations applicable thereto and if necessary establish other operational requirements without prior notice and public procedures thereon for such actions. Where practicable, notice of the District Commander's actions taken pursuant to this section shall be disseminated in Notices to Mariners, or otherwise, for the information of all concerned.

(c) Closure for repairs or maintenance. (1) When a draw must be closed for scheduled repairs or maintenance work, approval of the District Commander should be obtained at least 10 days prior to the date of the intended closure by the owners of or the agency controlling the drawbridge. The request for approval of the proposed closure shall include a brief description of the nature of the work to be performed and the times and dates of such closure. The granting of the approval will depend upon the necessity for the closure, the reasonableness of the time(s) and date(s) requested, and the overall effect on navigation.

(2) When a draw is closed for repairs in case of emergency or damage to the structure or for vital maintenance that may not be delayed, the owners of or the agency controlling the drawbridge shall immediately inform the District Commander concerned of the closure, the reasons for the closure, and the expected completion date of the emergency repairs. Normally, the extension of any period of emergency closure to include the accomplishment of routine maintenance or for other nonemergency purposes will not be authorized.

(d) Closure for public interest, health, and safety. In situations where the public interest, health, or safety so requires, including the holding of public functions or events such as street parades and marine regattas, the District Commander may authorize the temporary closure of a drawbridge. A request for approval of a temporary closure of a drawbridge for a street parade or marine regatta or otherwise should include a brief description of the proposed event or reason why closure of the drawbridge is desired, and the time and date of such closure. The closure of a drawbridge for public interest, health, or safety will depend upon the necessity for the closure, the reasonableness of the time and date (if requested), and the overall effect on navigation.

(e) Closure of draw for emergency vehicles. When a drawtender is informed by a reliable source that an emergency vehicle is due to cross the draw, he shall take all reasonable measures necessary to have the draw closed at the time the emergency vehicle arrives at the bridge.

§117.1b Signals.

(a) Sound signals. Sound signals shall be the primary signals to be used if weather conditions will permit sound signals to be heard by the drawtender and by the vessel operator. A prolonged blast shall be of four to six seconds duration and a short blast shall be of approximately one second duration. These signals may be made by a whistle, or horn, by shouting through a megaphone, or by other similar devices producing sound that can be clearly heard. If a drawbridge does not have sound signals individually specified in this Part, the following signals shall be used:

(1) Signal to request opening of draw. One prolonged blast followed by one short blast.

(2) Acknowledging signal by the drawtender. (i) When the draw will be opened immediately. One prolonged blast followed by one short blast, sounded not more than 30 seconds after the opening signal.

(ii) When the draw cannot be opened promptly or is open and must be closed promptly. Five short blasts, sounded in rapid succession not more than 30 seconds after the opening signal, repeated at regular intervals until acknowledged by a signal which has the same meaning from the vessel. As soon as the draw can be opened the drawtender shall sound the opening signal and open the draw for any vessel waiting to pass.

(b) Visual signals. These signals shall be used if weather, noise, or other conditions may prevent sound signals from being heard or if sound producing devices are not properly functioning. Sound signals may be used in conjunction with visual signals. If a drawbridge does not have visual signals individually specified in this Part, the following shall be used:

(1) Signal to request opening of draw. A white flag of sufficient size to be readily visible for a distance of one-half mile by day or a white or green light of sufficient intensity to be readily visible for a distance of one-half mile by night, raised and lowered vertically in full sight of the drawtender, repeated until acknowledged by the drawtender (mechanical devices or other objects using fixed or flashing lights which produce essentially the same signal, are permitted).

(2) Acknowledging signal by the drawtender. (i) When the draw will open promptly. Same as signal to request opening, displayed not more than 30 seconds after the opening signal.

(ii) When the draw cannot open promptly or is open and must be closed promptly. A red flag of sufficient size to be readily visible for a distance of one-half mile by day or a red light of sufficient intensity to be readily visible by night, swung back and forth horizontally in full sight of the vessel not more than 30 seconds after the opening signal is observed, and repeated until acknowledged by the vessel with a signal which carries the same meaning (mechanical devices or other objects using fixed or flashing lights which produce essentially the same signal, are acceptable). As soon as the draw can open, the drawtender shall give the opening signal and open the draw for any vessels waiting to pass.

(c) Draw will not open. When the signal from the bridge indicates that the draw will not open, the vessel shall not attempt to pass the closed draw until an opening signal is received from the bridge. However, if there is sufficient room, the vessel may advance into the fender system until the draw opens.

(d) Radiotelephones. When the request for draw opening and the answering acknowledgement is given by radiotelephone, sound or visual signals need not be used. Both vessel and bridge must continue to monitor the selected channel until the vessel has cleared the draw. If radiotelephone contact cannot be maintained, sound or visual signals shall be used.

(e) Contiguous drawbridges. When a vessel wishes to pass two or more drawbridges close together, the opening signal shall be given for the first bridge. After acknowledgement from the first bridge that it will open promptly, the opening signal shall be given for the second bridge and so on until all bridges that the vessel desires to pass have been given the opening signal and have acknowledged that they will open promptly.

(f) Vessels approaching a drawbridge. When two or more vessels are approaching the same drawbridge at nearly the same time from the same or opposite directions with the draw open or closed, each of these vessels shall signal independently for the opening of the draw, and the drawtender shall reply in turn to the signal of each vessel.

(g) When a vessel approaches a drawbridge in the open position, the vessel shall sound the opening signal. If no response is received, the vessel may proceed through the draw.

§117.710 Navigable waters of the United States within the State of California; bridges generally. (a) Operation requirements. The owners of or agencies controlling drawbridges shall provide the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draws for the passage of vessels.

(b) (Reserved).

(c) Prompt opening required except when delayed by train. The draw shall be opened with the least possible delay on receiving the prescribed signal: Provided, That the draw shall not be opened when a train is approaching so closely that it cannot be stopped safely before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the draw tender.

(d) Interference with operation of bridge prohibited. Trains and vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall watercraft be navigated so as to hinder or delay the operation of the draw, but all passage over or through a drawbridge shall be prompt to prevent delay to either land or water traffic.

(e) Vessels for which openings not required. A drawbridge shall not be required to open for any vessel carrying appurtenances unessential for navigation which extend above the normal superstructure, if the height of the normal superstructure would permit the vessel to pass under the closed bridge. Military masts shall be considered as part of the normal superstructure.

NOTE: On request, the District Commander will cause an inspection to be made of the superstructure and appurtenances of a vessel habitually frequenting that waterway with a view to adjusting any differences of opinion in this matter between the vessel owner and a bridge owner.

(f) Bridges requiring advance notice for prompt opening. (1) The owners of or agencies controlling bridges for the prompt opening of which advance notice is required by special regulations (§§117.712 to 117.718, inclusive) need not keep draw tenders in constant attendance at such bridges.

(2) Whenever a vessel, unable to pass under a closed bridge, desires to pass through the draw, advance notice, as specified in the special regulations, of the time the opening is required must be given to the authorized representative of the owner or agency controlling the bridge to insure prompt opening thereof at the time required. Unless otherwise provided in the special regulations, such advance notice may be given at any regular office of the owner of or agency controlling the bridge. Such notice may also be given to the draw tender or to the person named in the notice posted on the bridge in accordance with paragraph (f) (4) of this section.

(3) On receipt of such advance notice, the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draw on proper signal at approximately the time specified in the notice.

(4) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be read easily at any time, a copy of the special regulations pertaining to the respective bridges together with information as to whom notice should be given when it is desired that a bridge be opened and directions for communicating with such person by telephone or otherwise.

(5) Vessels desiring to pass through these bridges without having given advance notice as specified in the special regulations may be delayed, but the owners of or agencies controlling the bridges shall, under such circumstances, use every reasonable means to expedite openings.

(6) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

NOTE: The following special regulations (§§117.711 to 117.718, inclusive), modifying and supplementing the foregoing general regulations (§117.710), are prescribed for certain bridges where local conditions warrant.

§117.711 Cerritos Channel, Long Beach, Calif.

(a) The draw of the Commodore Schuyler F. Heim Highway bridge shall open on signal except that from 6:30 a.m. to 8 a.m. and 3:30 p.m. to 6 p.m., Monday through Friday except Federal holidays, the draw need not open for the passage of vessels.

(b) The draw of the Henry Ford Avenue bridge shall be maintained in the open to navigation position except when a train is crossing or when maintenance work is being performed.

(c) (1) The opening signal for the Heim bridge is three long blasts. The acknowledging signal is two long blasts followed by one short blast when the draw will open immediately, and four short blasts when the draw cannot open immediately.

(2) If the draw of the Henry Ford Avenue bridge is in the open position, the vessel may go through the open draw with no further signal. If the draw of the Henry Ford Avenue bridge is in the closed position, the opening signal is two short blasts followed by one long blast. The acknowledging signal is two long blasts followed by one short blast when the draw will open immediately, and four short blasts when the draw cannot open immediately.

(d) (1) Radiotelephones are installed to enable the draw tenders at the Heim bridge and the Ford bridge to communicate with vessels on radiotelephone frequency 156.65 megahertz (Channel 13), or such other frequency as may be assigned by the Federal Communications Commission.

(2) Self-propelled vessels over 300 GRT and passenger vessels over 100 GRT and towing vessels should not enter either end of Cerritos Channel until assurance that the draw(s) are able to open promptly on signal has been received by radiotelephone from the draw tender(s). When the Ford bridge is in the open position, vessels need not communicate with it and may pass the open draw. The bridge tender on the Heim bridge can advise vessels if the Ford bridge is open.

(3) Sound signals may be omitted when radiotelephone contact has been satisfactorily established and is maintained until the vessel has passed through the draw. If, for any reason, radiotelephone contact is broken, sound signals shall be used.

(e) The owners of or agencies controlling these bridges shall keep signs showing the opening and acknowledging signals conspicuously posted on the east side of the Commodore Heim bridge and the west side of the Henry Ford Avenue bridge, in such a manner that they can easily be read from an approaching vessel.

§117.712 Tributaries of San Francisco Bay and San Pablo Bay, Calif. (a) Mud Slough; Southern Pacific Company railroad bridge near Alviso. At least 24 hours' advance notice required.

(b) Newark Slough; Southern Pacific Company railroad bridge near Newark. At least 24 hours' advance notice required. To be given to the Superintendent, Southern Pacific Company, Oakland Pier, Oakland, California.

(c) San Leandro Bay; State of California highway bridge between Alameda and Bayfarm Island. From 9:00 p.m., to 5:00 a.m., the draw need not be opened for the passage of vessels. From 5:00 a.m., to 8:00 a.m. and from 5:00 p.m., to 9:00 p.m., at least 12 hours' advance notice required, to be given to the operator of the Bayfarm Island Bridge (telephone LAkehurst 2-2969) between 8:00 a.m. and 5:00 p.m., and to the operator of the Park Street Bridge, Alameda (telephone LAkehurst 2-7282) at all other times.

(d) Oakland Inner Harbor Tidal Canal; County of Alameda Highway bridges at Park, Fruitvale Avenue (Miller-Sweeny) and High Streets and Department of Army railroad bridge at Fruitvale Avenue. (1) From 7:30 a.m. to 8:30 a.m., and from 3:45 p.m. to 5:45 p.m., Monday through Friday, except holidays, the draw need not open for the passage of vessels except that–

(i) The draw shall open as soon as possible for vessels in distress, and emergency vessels, including commercial vessels engaged in rescue or emergency salvage operations; and

(ii) The draw shall open after two hours notice to the Park Street bridge for vessels which must, for reasons of safety, move on a tide or slack water.

(2) At all other times, the draw shall open on signal.

(e) Corte Madera Creek, Northwestern Pacific railroad bridge near Greenbrae. (1) The draw shall open on signal if at least 24 hours notice has been given. However, from May 1 through October 31 on Saturdays, Sundays, and holidays that are observed on Monday and Friday during this period, the draw shall open on signal from 8 a.m. on the first day of the holiday or weekend until 10 p.m. on the last day of the weekend or holiday. If no drawtender is present during these periods the draw shall be maintained in the fully open position.

(2) The owner of or agency controlling this bridge shall keep conspicuously posted on both sides of the bridge a copy of the provisions of this paragraph together with information stating exactly how the authorized representative may be reached.

(f) Channel Street (Mission Creek, China Basin) and Islais Creek. City and County of San Francisco drawbridges at Third and Fourth Street over the Channel Street waterway and Third Street over Islais Creek. (1) At least one hours' advance notice required.

(g) Petaluma River–(1) Northwestern Pacific Railroad Drawbridge at Blackpoint and Haystack Landing. The owner of or agency controlling these bridges need not keep a drawtender in constant attendance except when the draw is in the closed position. When the draw is closed and visibility at the drawtender's station is less than 1 mile, up or down the channel, the drawtender shall sound two long blasts every minute. When the draw is fully opened again, the drawtender shall sound 3 blasts once to indicate the draw is in the fully open position.

(2) City of Petaluma highway bridge at "D" Street. The draw shall open on signal if at least four hours notice is given.

(h) Sonoma Creek–(1)(Reserved)

(2) Northwestern Pacific Railroad Company bridge at Wingo. At least 24 hours' advance notice required.

(i) Mare Island Strait, Napa River, and their tributaries–(1) U.S. Navy Bridge (Mare Island Causeway) at Vallejo. (i) The draw shall open on weekdays on signal from 7:30 a.m. to 3:45 p.m., and 4:45 p.m. to 10 p.m. and from 6:30 a.m. to 10 p.m. on Saturdays, Sundays, and holidays.

(ii) From 6:30 a.m. to 7:30 a.m. and 3:45 p.m. to 4:45 p.m., daily, except Saturdays, Sundays, and holidays, the draw need not open for the passage of vessels other than public vessels of the United States.

(iii) From 10 p.m. to 6:30 a.m., daily, the draw shall open on signal if at least 2 hours notice is given.

(2) Southern Pacific railroad bridge at Brazos. The owner of or agency controlling this bridge need not keep a drawtender in constant attendance except when the draw is in the closed position. When the draw is closed and visibility at the drawtender's station is less than 1 mile, up or down the channel, the drawtender shall sound 2 long blasts every minute. When the draw is fully opened again the drawtender shall sound 3 blasts once to indicate the draw is in the fully open position.

(3) Imola Avenue highway bridge at Napa. 72 hours advance notice required.

(4) Dutchman Slough; James Irvine Bridge. At least 24 hours' advance notice required.

§117.713 Minor tributaries of Suisun Bay, Calif. (a) Pacheco Creek; Contra Costa County highway bridge and Southern Pacific Company railroad bridge near Martinez. At least 24 hours' advance notice required.

(b) Cordelia Slough; a tributary of Suisun Slough; Southern Pacific Company railroad bridge. At least 24 hours' advance notice required.

§117.714 San Joaquin River and its tributaries, California. (a) San Joaquin River. (1) Drawbridges from Stockton to Old River junction. The draws shall open on signal if at least twelve hours notice is given to the owners' agents at Stockton as follows:

(i) Port District railway bridge at Stockton-Port Director.

(ii) U.S. Navy Highway bridge at Stockton-U.S. Naval Communications Station.

(iii) Atchison, Topeka and Santa Fe Railway Company bridge at Stockton–Atchison, Topeka and Sante Fe Railway Company Yardmaster.

(iv) State of California Highway bridge (Garwood Bridge) near Stockton–State Highways District Office.

(2) Drawbridges above the Old River junction need not open for the passage of vessels.

(b) Burns Cutoff, drawbridges. The draw shall open on signal if at least 48 hours notice is given to the U.S. Naval Communications Station, Stockton.

(c) Middle River. (1) Mouth to Woodward Canal, drawbridges.

(i) San Joaquin County highway bridge between Bacon Island and Lower Jones tract. From May 15 through September 15, the draw shall open on signal from 9 a.m. to 5 p.m.; from September 16 through May 14, the draw shall open on signal from 9 a.m. to 5 p.m. from Thursday through Monday. At all other times the draw shall open on signal if at least 12 hours notice is given to the San Joaquin County Department of Public Works, Stockton.

(ii) The Atchison, Topeka and Santa Fe Railway Company bridge near Middle River Station. The draw shall open on signal if at least 12 hours notice is given the Atchison, Topeka and Santa Fe Railway Company Yardmaster, Stockton.

(2) Drawbridges above Woodward Canal need not open for the passage of vessels.

(d) Old River. State of California highway bridge between Victoria Island and Byron Tract.

(1) From May 1 through October 31, the draw shall open on signal from 6 a.m. to 10 p.m.

(2) From November 1 through April 30, the draw shall open on signal from 9 a.m. to 5 p.m.

(3) At all other times, the draw shall open on signal if at least 4 hours notice is given to the Rio Vista Bridge, except that the draw shall open on signal if at least 1 hours notice is given for emergency vessels owned, operated or controlled by the United States or the State of California, for commercial vessels engaged in rescue or emergency salvage operations, or for vessels in distress.

(e) Grant Line Canal. San Joaquin County highway bridge. The draw shall open on signal if at least 12 hours notice is given to the San Joaquin County Department of Public Works, Stockton.

(f) Mokelumne River. (1) State of California highway bridge at East Isleton.

(i) From May 1 through October 31, the draw shall open on signal from 6 a.m. to 10 p.m.

(ii) From November 1 through April 30, the draw shall open on signal from 9 a.m. to 5 p.m.

(iii) At all other times, the draw shall open on signal if at least 4 hours notice is given to the Rio Vista Bridge, except that the draw shall open on signal if at least 1 hours notice is given for emergency vessels owned, operated, or controlled by the United States or the State of California, for commercial vessels engaged in rescue or emergency salvage operations, or for vessels in distress.

(2) Sacramento and San Joaquin Counties highway bridge (Millers Ferry Bridge) over the North Fork of the Mokelumne River near Walnut Grove.

(i) From May 1 through October 31, from 9 a.m. to 5 p.m. the draw shall open on signal.

(ii) At all other times the draw shall open on signal if at least 12 hours notice is given to the San Joaquin County Department of Public Works, Stockton.

(3) San Joaquin County highway bridge over the South Fork of the Mokelumne River at New Hope Landing. Upon notice from the District Commander that an emergency exists which requires the removal of the span, the bridge owner shall take out the removable span expeditiously.

(4) Drawbridges above New Hope Landing. The draws of these bridges need not open for the passage of vessels. The owners of or agencies controlling these bridges shall restore the draws to full operation within 6 months of notification to take such action by the Commandant, U.S. Coast Guard.

(g) Little Potato Slough. State of California highway bridge at Terminous.

(1) The draw shall open on signal from July 1 through September 30 from 8 a.m. to 5 p.m.

(2) At all other times the draw shall open on signal if at least 4 hours notice is given to the Rio Vista Bridge.

(h) Snodgrass Slough, drawbridges. The draws shall open on signal if at least 24 hours notice is given to the owners' agent as follows:

(1) Southern Pacific Transportation Company bridge-Southern Pacific Transportation Company Yardmaster, Roseville.

(2) Sacramento County highway bridge-Sacramento County Highway Department office, Sacramento.

(i) King Island Cut. San Joaquin County highway bridge between King Island and Biship Tract. The draw shall open on signal if at least 12 hours notice is given to the San Joaquin County Department of Public Works, Stockton.

(j) Honker Cut. San Joaquin County bridge, between Empire Tract and King Island. The draw shall open on signal if at least 12 hours notice is given to the San Joaquin County Department of Public Works, Stockton.

§117.715 Georgiana Slough, California, drawbridges. (a) (Reserved).

(b) Sacramento County highway bridges near Isleton and Walnut Grove. (1) From May 1 through October 31, the draws shall open on signal from 6 a.m. to 10 p.m.

(2) From November 1 through April 30 the draws shall open on signal from 9 a.m. to 5 p.m.

(3) At all other times, the draws of these bridges shall open on signal if at least 4 hours notice is given to the Rio Vista Bridge, except that the draws shall open on signal if at least 1 hour notice is given for emergency vessels owned, operated or controlled by the United States or the State of California, for commercial vessels engaged in rescue or emergency salvage operations, or for vessels in distress.

(c) Southern Pacific railroad bridge near Isleton. The draw shall be maintained in the fully open position; except that the draw may close for the passage of trains. When the draw is closed and visibility from the drawtender's station is less than 1 mile up or down the channel, the drawtender shall sound 2 long blasts every minute. When the draw is reopened, the drawtender shall sound one long blast followed by one short blast.

§117.716 Sacramento River and its tributaries, California. (a) Sacramento River. (1) Isleton to American River junction, drawbridges.

(i) From May 1 through October 31, the draws shall open on signal from 6 a.m. to 10 p.m.

(ii) From November 1 through April 30, the draws shall open on signal from 9 a.m. to 5 p.m.

(iii) At all other times, the draws shall open on signal if at least 4 hours notice is given to the Rio Vista Bridge, except that the draws shall open on signal if at least 1 hour notice is given for emergency vessels owned, operated or controlled by the United States or the State of California, for commercial vessels engaged in rescue or emergency salvage operations, or for vessels in distress.

(2) American River junction to Chico Landing, drawbridges. The draw shall open on signal if at least 12 hours notice is given to the owners' agents as follows:

(i) Southern Pacific railroad bridge at Knights Landing–Southern Pacific Yardmaster, Roseville.

(ii) State of California highway bridge at Knights Landing–State Division of Highways Office, Woodland.

(iii) State of California highway bridge at Meridian–State Division of Highways Office, Marysville.

(iv) Colusa County highway bridge at Colusa–Colusa County Sheriff's Office, Colusa.

(v) State of California highway bridge at Butte City–State Division of Highways Office, Gridley.

(3) Drawbridges above Chico Landing. The draws of these bridges need not open for the passage of vessels. The owners of or agencies controlling these bridges shall restore the draws to full operation within 6 months of notification to take such action from the Commandant, U.S. Coast Guard.

(b) Steamboat Slough, State of California highway bridge at the head of Grand Island. (1) (Reserved).

(2) From May 1 through October 31, the draw shall open on signal from 6 a.m. to 10 p.m.

(3) At all other times the draw shall open on signal if at least 4 hours notice is given to the Rio Vista Bridge, except that the draw shall open on signal if at least 1 hours notice is given for emergency vessels owned, operated or controlled by the United States or the State of California, for commercial vessels engaged in rescue or emergency salvage operations, or for vessels in distress.

(c) Miner Slough. State of California highway between the northerly end of Ryer Island and Holland Tract. The draw shall open on signal if at least 12 hours notice is given to the Rio Vista Bridge.

(d) Sutter Slough. Sacramento County highway bridge near Courtland. The draw need not open for the passage of vessels. The owner of or agency controlling the bridge shall restore the draw to full operation within 6 months of notification to take such action from the Commander, Twelfth Coast Guard District.

(e) American River. State of California highway bridge at Sacramento. The draw need not open for the passage of vessels.

(f) Lindsey Slough. The center span of the Hastings Farms highway bridge between Egbert and Lower Hastings Tracts shall be removed if at least 72 hours notice is given to the Hastings Farms Office, San Francisco.

§117.718 Eureka Slough, near Eureka, Calif. At least 24 hours' advance notice required.

§117.720 Coos Bay, Oreg.

(a) (Reserved)

(b) Bridge of Southern Pacific Railroad Co. below North Bend. (1) The drawspan of the bridge shall be kept open at all times except while actually required for the necessary passage of trains over the drawspan.

(2) During foggy weather a fog bell installed in the center of the drawspan shall be rung continuously, striking every 10 seconds.

(3) Any time during foggy weather, when the draw is closed and the passage is not clear for boats, there shall be sounded continuously a siren which may be heard at a distance of 1 mile from the drawspan. When the bridge is again opened the siren shall be stopped, indicating that the way is clear for the passage of boats.

§117.725 Umpqua River, Oregon. Southern Pacific Transportation Company bridge at Reedsport. (a) The drawspan of the bridge shall be kept open at all times except when actually required for the passage of trains or other railroad equipment or when maintenance to the drawspan is being performed. (b) During foggy weather, when the draw is closed and the channel is not clear for the passage of vessels, there shall be sounded a fog horn with an audible range of one half mile from the drawspan. The fog horn shall emit two clear signals of approximately six seconds duration each, repeated at intervals of sixty seconds from completion of the second signal to commencement of the next signal. The fog horn shall be sounded repeatedly from commencement of closure to full opening of the drawspan. When the drawspan is again in the open position the fog horn shall be stopped, indicating that the channel is clear for the passage of vessels.

§117.735 Nehalem River, Oregon Highway Bridge, Mile 6.5. The draw need not open for the passage of vessels. However, the draw shall be returned to operable condition within 6 months after notification from the Commandant, U.S. Coast Guard, to take such action.

§117.739 Umpqua River, Dean Creek, Little Nestucca River, and Skipanon River, Oreg.; bridges. The Oregon State Highway Department drawbridges across Umpqua River, Mile 11.0, side channel, near Gardiner, north of Bolon Island; Dean Creek at its mouth near Reedsport; Little Nestucca River, Mile 2.0, near Oretown; and Skipanon River, Mile 2.5, upstream from Warrenton need not be opened for the passage of vessels.

§117.740 Youngs Bay, Lewis and Clark River and Skipanon River, Oreg.; bridges (a) The drawbridges across Youngs Bay, Lewis and Clark River and Skipanon River, all in Clatsop County, shall open on signal for the passage of vessels. The signals which may be made by a whistle, horn, siren, trumpet or by shouting for each bridge are:

(1) Highway bridge across Youngs Bay at Smith Point–two long blasts followed by two short blasts.

(2) Burlington Northern (Spokane, Portland, and Seattle) railroad bridge across Youngs Bay at Smith Point–one long blast followed by one short blast.

(3) Youngs Bay highway bridge at the foot of Fifth Street, Astoria–two long blasts followed by one short blast.

(4) Lewis and Clark River highway bridge, near the mouth–one long blast followed by four short blasts.

(5) Skipanon River railroad and highway bridges at Warrenton–one long blast followed by one short blast.

Note 1: Pursuant to an agreement between the United States and the State of Oregon, the regulations in paragraph (a) pertaining to the highway bridge on the Skipanon River are suspended. The agreement states, in part–

The State of Oregon agrees to schedule two openings of the existing bridge each week to permit the passage of maritime traffic on the Skipanon River. This schedule will be subject to the approval of the Coast Guard. The two weekly openings will be scheduled no closer than every three days. The State will not schedule openings during peak vehicular traffic hours.

The State of Oregon will not be required to open the bridge at the scheduled time unless a request to do so is received by the State, or the State's agent for that purpose, within twelve hours of the scheduled opening.

The State of Oregon will not be required to open the bridge during peak vehicular traffic hours. Peak vehicular traffic hours are agreed to be between 0730 and 0930, and 1630 and 1830 on Mondays through Fridays, excluding holidays.

The State of Oregon agrees to post appropriate public notices on the bridge and in local periodicals, advising the public of the schedule of openings and the procedures for passing through the bridge.

Note 2: The regulations in paragraph (a) pertaining to the railroad bridge on the Skipanon River are suspended, and the railroad bridge will operate on the schedule established for the highway bridge in Note 1.

§117.750 Willamette River at Portland, Oreg., Columbia River at Vancouver, Wash., and North Portland Harbor (Oregon Slough), Oreg.; bridges (highway and railroad): Signals. (a) Call signals for opening of draw. These signals shall be as prescribed for each bridge in paragraph (b) of this section. It is given by vessels as notice to bridge operators to open the draw, or in case the draw is already open, that they intend to pass through. A call signal given twice in rapid succession indicates that vessel has authority to pass bridges during closed periods (see paragraph (f) (1) of this section).

(b) Answering signals–(1) Acknowledging signal. Shall be the same as the call signal for each bridge. Its purpose is to acknowledge the call signal of a vessel and to indicate that the operator intends to open the draw as soon as practicable, or that he will hold it open.

(2) Danger signal. Shall consist of a series of short blasts, at least four, given in rapid succession, and repeated if necessary. Its purpose is to answer the call signal of a vessel, but to indicate that the draw cannot or will not be opened at once, or, when vessels are waiting in the vicinity, that the draw, if open, is about to be closed. It is also to be

used in emergency to revoke an acknowledging signal.

(3) Rescinding signal. Shall be the reverse of the call signal for each bridge. It is given by a vessel to cancel a previous call signal, to indicate that the vessel does not intend to pass through and that the draw need not be opened, or may be closed.

(4) Answer to rescinding signal. (i) Answer by the bridge operator to a rescinding signal shall be the danger signal (see paragraph (b)(2) of this section).

(5) Call signals. The following call signals are prescribed for vessels wishing to have the drawspans opened or held open.

(i) Burlington Northern railroad bridge, at Vancouver, Wash., one long followed by one short blast.

(ii) Interstate Highway Bridge, at Vancouver, Wash., two long followed by one short blast.

(iii) (Reserved)

(iv) Burlington Northern railroad bridge, at St. Johns Oreg., one long followed by one short blast.

(v) Broadway Bridge, two long followed by one short blast.

(vi) Oregon-Washington Railroad & Navigation Co. bridge, one long followed by one short blast.

(vii) Burnside Bridge, one long followed by two short blasts.

(viii) Morrison Bridge, one long followed by three short blasts.

(ix) Hawthorne Bridge, one long followed by four short blasts.

Call signals may be given on any form of whistle, horn, siren, or trumpet with sufficient range or volume to be heard by bridge operators.

(c) To bridge owners. All bridges to which this section applies shall be equipped with suitable air whistles of sufficient size and range that signals sounded on same shall be distinctly audible up and down stream under adverse wind and weather conditions for a distance of 2,500 feet, except for the Burlington Northern Railroad Co. bridges over Columbia and Willamette Rivers which shall have a range of at least 5,000 feet under the same conditions.

(d) To navigators. (1) A vessel, desiring at any time (except during closed periods, see paragraph (f) (1) of this section) to pass through any of the above-mentioned bridges, under which it cannot pass with the draw closed, shall sound the call signal for such bridge as prescribed in paragraph (b) of this section, and shall repeat such signal at intervals until it is answered by the operator of the bridge (see paragraphs (a) and (e) of this section). In case two vessels approaching from opposite directions would meet at or near the bridge, the vessel bound downstream shall be considered as having the right of way. When either vessel waits for passage of the other, it shall again give the call signal for the bridge and receive acknowledgment before proceeding. It is incumbent upon navigators to make sure that their signals are understood before proceeding through a drawspan, and when approaching bridges, vessels should be kept under control, with a view to stopping, if necessary, before reaching the bridge.

(2) Vessels authorized to pass through bridges during closed periods, as provided in paragraph (f)(1) of this section, shall sound the call signal twice in rapid succession. Signals to open shall be given by vessels at a distance of at least 1,000 feet from the bridge, except in case of a vessel leaving a wharf or anchorage or when waiting less than 1,000 feet from the bridge. In such cases the signal shall be given early enough to allow the operator of the bridge sufficient time in which to clear and open the draw before arrival of the vessel.

(3) All vessels when passing any bridge shall be moved as expeditiously as is consistent with established rules governing speed in the harbor of Portland, and all towboats engaged in handling other craft or in towing logs through any of the bridges shall be of sufficient power to handle the tow without unduly delaying the closing of the drawspan.

(4) Vessels with hinged or adjustable masts or booms projecting above their fixed structures shall lower same and pass under the bridge, if practicable, without signaling for the draw to open.

(e) To bridge operators. (1) If the bridge can be opened, or is already open, when a call signal is given, the operator shall promptly answer the vessel calling by giving the acknowledging signal and promptly open the draw (except during closed periods, see paragraph (f)(1) of this section) or hold it open, as the case may be.

(2) In case the draw cannot be opened at once when the call signal is given, the operator shall promptly answer the vessel calling by giving the danger signal and shall repeat same, if necessary. As soon as the exigency which prevented opening has been removed the bridge operator shall promptly sound the regular acknowledging signal for that bridge to advise vessels that the draw can be opened at once, and he shall thereupon proceed to open same if there is a vessel waiting to pass through.

(3) When two vessels arrive at a bridge at or near the same time and blow the call signal, lift spans, when opened, shall be raised high enough to clear the taller vessel. If either vessel at any drawbridge waits for passage of the other and again gives the call signal, the bridge operator shall promptly answer with the acknowledging signal and shall hold the span open. In case the intentions of a waiting vessel are not understood by a bridge operator, when the draw is open he shall sound the danger signal as a warning to vessels that he is about to close the draw.

(4) If a rescinding signal is given by a vessel to cancel a previously given call signal, and it is evident the vessel does not intend to pass through, the bridge operator shall answer with the danger signal (four or more short blasts) and may then close the draw, or need not open it.

(f) Closed periods. (1) The periods from 7 a.m. to 8:30 a.m. and 4 p.m. to 5:30 p.m. are hereby designated closed periods during which the draw spans of bridges carrying street traffic over Willamette River at Portland shall not be opened to navigation except as below provided, or when necessary to prevent accident.

(2) Closed periods above defined shall not be effective on Saturday, Sunday, New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day, or days observed in lieu of these under State law: Provided, That closed periods shall not apply against harbor patrol or fire boats answering calls. At the Broadway Bridge only, oceangoing vessels of 750 gross tons or over that are entering the harbor directly from the ocean may signal and pass through this bridge at any hour. Vessels authorized to pass through bridges during closed periods or in case of emergency when opening of the draw is necessary to prevent accident, shall sound the call signal twice in rapid succession, i.e., with an interval of not over 5 seconds between signals. The Broadway Bridge shall be opened, however, for oceangoing vessels of 750 tons or over under the rule above whether the vessel gives a single or double call signal.

§117.755 Willamette River, Oreg.; bridges above Oregon City, Oreg. (a) Southern Pacific Transportation Co. drawbridge at Salem. The draw need not open for the passage of vessels. However, the draw shall be returned to an operable condition within six months after notification from the Commandant, U.S. Coast Guard, to take such action.

(b) (Reserved)

(c) Southern Pacific Transportation Co. bridge near Harrisburg, Oreg. The draw need not be opened for navigation and the operating machinery need not be maintained. However the draw shall be returned to an operable condition within 6 months after notification from the Commandant to take such action.

§117.758 Skamokawa Creek, Wash.; Washington State Highway bridge at Skamokawa. The draw of the bridge need not be opened for the passage of vessels.

§117.758a Columbia River, Vancouver, Wash. (a) The draws of the highway vertical lift drawbridges (Interstate 5) need not open for the passage of vessels from 6:30 a.m. to 8 a.m. and 3:30 p.m. to 6 p.m., Monday through Friday, except holidays.

(b) The draws need not open at any time for the passage of recreation vessels that may pass under the several fixed navigation spans which provide a higher vertical clearance than the draw span.

§117.759a Columbia River; Spokane, Portland and Seattle Railway Co. bridge between Wishram, Wash., and Celilo, Oreg. (a) The owner of, or agency controlling the bridge, shall provide the necessary equipment, controls and personnel necessary for the safe, prompt and efficient opening of the draw upon signal at any time of the day or night for the passage of any vessel or other watercraft which cannot pass under the closed draw.

(b) (Reserved).

(c) The operating machinery of the draw shall be maintained in a serviceable condition and the draw shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper condition for prompt operation.

(d) The owner of, or agency controlling the bridge, shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such a manner that it can be easily read at any time, a copy of the regulations of this section.

§117.759b Drawbridges across navigable waters in Oregon where constant attendance is not required.

(a) Drawtenders are not required to be in constant attendance at the bridges listed in this section.

(b) The owner of or agency controlling each bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge or elsewhere, in such manner that they may be readily read from an approaching vessel, a resume of the regulations of this section pertaining to each bridge, together with information as to whom notice should be given when an opening is required and directions for communicating with such persons by telephone or otherwise.

(c) Prompt openings of the draw shall be made at the time agreed upon.

(d) Test openings shall be made frequently enough to ascertain that the operating machinery of the draws is in serviceable condition.

(e) (Reserved).

(f) The bridges to which this section applies and the regulations applicable in each case are as follows:

(1) Southern Pacific Transportation Co. drawbridge across Coalbank Slough. The draw need not open for the passage of vessels. However, the draw shall be returned to an operable condition within six months after notification from the Commandant, U.S. Coast Guard, to take such action.

(2) (Reserved)

(3) Railroad bridge across Siuslaw River at Cushman. The draw shall open on signal if at least 24 hours' notice has been given.

(4) (Reserved)

(5) Burlington Northern railroad bridge at North Portland Harbor (Oregon Slough). The draw shall open on signal if at least one-half hour notice has been given.

(6) Southern Pacific Transportation Co. drawbridge across the Willamette River at Albany. The draw need not open for the passage of vessels. However, the draw shall be returned to an operable condition within six months after notification from the Commandant, U.S. Coast Guard, to take such action.

(7) Oregon State Highway Department bridge, Van Buren Street, Corvallis. The draw shall open on signal if at least 7 days' notice has been given, however, the draw need not open on Saturdays, Sundays, and legal holidays.

(8) Highway bridge across the Columbia River between Hood River, Oreg. and White Salmon, Wash. The draw shall open on signal if at least 12 hours' notice has been given.

(9) Highway bridge across the Coquille River at Coquille. The draw shall open on signal if at least 48 hours' notice has been given.

(10) Burlington Northern, Inc. (Spokane, Portland, and Seattle Railway Company) railroad bridges across the John Day River near Astoria, Blind Slough and the Clatskanie River near Clatskanie. The draws shall open on signal if at least 1 hour's notice is given. However, the draws shall open promptly on signal from 4 hours before to 4 hours after each day's authorized commercial fishing period in the Columbia River Fishery below Bonneville Dam to the jetties at the mouth of the Columbia River as established by the Columbia River Compact (Washington State Department of Fisheries and the Fish Commission of Oregon).

(11) Oregon Coast U.S. 101 drawbridges across the Siuslaw River at Florence and the Coquille River at Bandon. The draws shall open on signal if at least 2 hours' notice is given. This notice may be given by marine radio, telephone, radiotelephone via the marine operator, or any other suitable means to the Coos Bay South Slough Bridge attendant.

(12) Coos River secondary highway drawbridge across the Isthmus Slough at Coos Bay. The draw shall open on signal if at least 4 hours' notice is given.

(13) Coos River secondary highway drawbridge across the Coos River at Coos Bay. The draw shall open on signal if at least 12 hours notice is given.

(14) Coos River secondary highway drawbridge across Catching Slough at Coos Bay, lower Columbia River highway drawbridge across the John Day River at Astoria and the Nehalem secondary highway drawbridge across the Walluski River at Astoria. The draws shall open on signal if at least 48 hours notice is given.

(15) Oregon Coast highway drawbridge across Coalbank Slough at Coos Bay. The draw need not open for the passage of vessels and the machinery for the draw need not be maintained in operable condition. However, the draw shall be returned to operable condition by the owner of the bridge within six months after notification by the Commandant, U.S. Coast Guard, to take such action.

(16) Umpqua River highway drawbridge at Reedsport, Oreg. The draw shall open on signal from 8 a.m. to 4 p.m., Monday through Friday. At all other times the draw shall open on signal if at least 4 hours notice is given.

§117.760 Columbia and Snake Rivers in the vicinity of Pasco, Wash.; bridges. (a) The draws of the Union Pacific Railroad bridge across the Columbia River at mile 323.5 between Burbank and Kennewick and the Burlington Northern Railroad bridge across the Snake River at mile 1.5 between Pasco and Burbank shall open on signal.

(b) The draw of the Burlington Northern railroad bridge across the Columbia River at mile 328.0 between Pasco and Kennewick shall open on signal from 8 a.m. to 4 p.m. At all other times the draw shall open on signal if at least 2 hours' notice is given through the General Yardmaster, Pasco, Washington. The owner of or agency controlling this bridge shall, on both the upstream and downstream sides of the bridge, post a notice stating how and to whom notice is to be given.

(c) Signals.

(1) Opening sound signal-to be repeated until acknowledged by the drawtender.

(i) Union Pacific Railroad bridge-2 long blasts and 1 short blast;

(ii) Burlington Northern Railroad bridges-1 long blast and 2 short blasts.

(2) Opening visual signals may be used in conjunction with sound signals for all bridges listed in this section. These visual signals are a white flag by day and a white light at night swung in a full circle at arm's length in full sight of the bridge facing the draw.

(3) The acknowledging sound signal shall be the same as the opening sound signal when the draw will open. When the draw cannot open, the signal shall be 4 short blasts, given in rapid succession, repeated until acknowledged by the same signal from the vessel.

(4) Sound and visual signals may be omitted when radiotelephone communications have been satisfactorily established and maintained between the draw-tender and the approaching vessel, until the vessel has passed through the bridge.

(d) When two vessels approaching from opposite directions meet near a drawbridge listed in this section, the downbound vessel shall have the right-of-way. When one vessel waits for passage of another, the waiting vessel shall repeat the call signal for the bridge and receive an acknowledging signal from the drawtender before proceeding.

(e) Vessels with hinged or adjustable masts or booms projecting above their fixed structure shall lower these appurtenances and pass under the bridges, if practicable, without signaling for the draw to open.

§117.762 Snake River at Lewiston, Idaho, and Clarkston, Washington. (a) Idaho/Washington Interstate Highway Bridge, Mile 139.6. The draw shall open at the following times if at least 2 hours' notice is given to the Washington State Department of Highways:

March 15 to November 15: 6 a.m., 10 a.m., 3 p.m., 7 p.m., 9 p.m.

November 16 to March 14: 9 a.m., 10 a.m., 2 p.m., 3 p.m.

(b) The owner of or agency controlling the bridge shall keep a copy of these regulations, and a notice stating how the advance notices are to be given conspicuously posted on both the upstream and downstream sides of the bridge.

§117.765 Cowlitz and Lewis Rivers, Wash.; bridges. (a) General regulations. (1) The corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical devices for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(2) (Reserved).

(3) (Reserved).

(4) When fog prevails by day or by night the drawtender on giving signal that the draw will be

opened, shall toll a bell continuously during the approach and passage of the vessel.

(5) The draw shall be opened with the least possible delay upon receiving the prescribed signal: Provided, That the drawspan shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the operator of the drawspan.

(6) Trains, wagons, and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall water craft or vessels be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or under a drawbridge shall be prompt, to prevent delay to either land or water traffic.

(7) This paragraph shall apply in the cases of all bridges, but to provide for intermittent attendance of bridge tenders on bridges across streams where water traffic is minor, or at times non-existent, the special regulations and exceptions in paragraph (b) of this section are prescribed.

(b) Special regulations--(1) Northern Pacific Railway Company bridge across Lewis River. The draw of the bridge need not be opened for the passage of vessels, and paragraph (a) of this section shall not apply to this bridge.

(2) Cowlitz River; highway bridge at Allen Street, Kelso, Wash.

(i) The owner of or agency controlling the drawbridge will not be required to keep a draw tender in constant attendance.

(ii) Whenever a vessel unable to pass under the closed bridge desires to pass through the draw, at least 2 hours' advance notice of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge. In the event a vessel is delayed by weather conditions or otherwise, the operator will remain a reasonable time, not to exceed 2 hours, and open the bridge on signal for the passage of the vessel. If a vessel is expected to be delayed more than 2 hours the operator will be so advised, and notified of the later time the opening will be required.

(iii) Upon receipt of advance notice the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel. If a vessel passing through the bridge intends to return through within 2 hours the bridge tender will be advised of the fact and he will remain at and open the bridge upon signal for the vessel's return passage.

(iv) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in a manner that it can be easily read at any time, a copy of these regulations, together with a notice stating exactly how the authorized representative may be reached by telephone or otherwise.

(v) The operating machinery of the draw shall be maintained in a serviceable condition and the draw opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

§117.770 Willapa Harbor and navigable tributaries, Washington; bridges. (a) General regulations. (1) The corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical devices for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(2) The person in charge of a vessel desiring to pass shall cause to be sounded, within reasonable hearing distance of the bridge, repeating if necessary, and in time to give due notice to its operator, the proper signal for the bridge, as described in paragraph (b) of this section.

(3) When the draw of the bridge can be opened immediately, the draw tender shall reply by one long distinct blast, followed by one short distinct blast of a horn or whistle.

(4) When the draw of the bridge cannot be opened immediately, the draw tender shall reply by four short distinct blasts of a horn or whistle. (This signal may also be used by a vessel to countermand its signal to open the draw.)

(5) Trains and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening nor shall watercraft or vessels be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or under the drawbridge shall be prompt to prevent delay to either land or water traffic.

(b) Special regulations. (1) The following signals are prescribed for vessels wishing to have the draws opened:

(i) Washington State highway bridge, North Fork, Willapa River, at Raymond, Washington: One long blast of horn or whistle followed quickly by one short blast and one long blast.

(ii) Northern Pacific Railroad bridge, South Fork, Willapa River at Raymond, Washington: Two long blasts of a horn or whistle, followed quickly by one short blast.

(iii) (Reserved)

(iv) Washington State highway bridge, Naselle River, about 6 miles downstream from Naselle, Washington: One long blast of a horn or whistle.

(2) Constant attendance by drawtenders is not required at the State highway bridges across the North Fork of Willapa River at Raymond and the Naselle River about 6 miles downstream from Naselle. Vessels requiring openings of these bridges shall give advance notice of not more than 2 hours for openings between 8 a.m. and 5 p.m. on all days except Saturdays, Sundays, and legal holidays, and advance notice of not more than 8 hours for openings at any other time. The owner of the bridges shall keep conspicuously posted on both the upstream and downstream sides, in such a manner that they can be easily read at any time, copies of the regulations of this section, together with notices stating exactly how the bridge operators may

be reached to obtain openings of the bridges, including names, addresses, and telephone numbers.

§117.775 Grays Harbor and tributaries, Washington; bridges. (a) General regulations. (1) The corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical devices for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(2) If the weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through the draw:

(i) The person in charge of such vessel desiring to pass shall cause to be sounded, within reasonable hearing distance of the bridge, repeating if necessary, and in time to give due notice to its operator, three long distinct blasts of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell.

(ii) When the draw of the bridge can be opened immediately the draw tender shall reply by two long blasts followed by one short distinct blast of a whistle, horn, or megaphone, or by three loud and distinct strokes of a bell.

(iii) When the draw of the bridge cannot be opened immediately, the draw tender shall reply by two long distinct blasts of a whistle, horn, or megaphone, or two distinct strokes of a bell. (This signal may also be used by a vessel to countermand its signal to open draw.)

(iv) When, after a delay as in paragraph (a)(2) (iii) of this section, the draw of the bridge can be opened and the vessel still desires to pass, the draw tender shall give the signal described in paragraph (a)(2) (ii) of this section, viz, two long blasts followed by one short distinct blast of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell.

(3) When weather conditions prevent hearing sound signals:

(i) The person in charge of a vessel desiring to pass shall swing a white lighted lantern or white flag, the former by night, the latter by day; the person signaling to face the drawbridge and swing the lantern or flag in front of him at arm's length, in vertical circles.

(ii) When the draw of the bridge can be opened immediately, the draw tender shall reply by raising and lowering a white lighted lantern or a white flag, the former by night, the latter by day; the movement to be vertical.

(iii) When the draw of the bridge cannot be opened immediately, the draw tender shall reply by swinging a red lighted lantern or red flag, the former by night, the latter by day; the person signaling to face the vessel and swing the lantern or flag in front of him at arm's length, in vertical circles. (This signal may also be used by a vessel to countermand its signal to open draw.)

(iv) When, after a delay, as in paragraph (a)(3) (iii) of this section, the draw of the bridge can be opened and the vessel still desires to pass, the draw tender shall give the signal described in paragraph (a)(3) (ii) of this section, viz, raising or lowering a lighted lantern or a flag.

(4) When fog prevails by day or by night the draw tender on giving signal (paragraphs (a)(2) (ii), (2) (iv), (3) (ii), or (3) (iv) of this section) that draw will be opened, shall toll a bell continuously during the approach and passage of the vessel.

(5) The draw shall be opened with the least possible delay upon receiving the prescribed signal: Provided, That the drawspan shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the operator of the drawspan.

(6) Trains, wagons, and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall water craft or vessels be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or under a drawbridge shall be prompt to prevent delay to either land or water traffic.

(7) This paragraph shall apply in the cases of all bridges, but to provide for distinctive signals given by vessels to particular bridges, as where two or more are within sight or hearing and but one bridge is desired to be opened, the special regulations and exceptions in paragraph (b) are prescribed.

(b) Special regulations.

(1) State bridge over Hoquiam River at Simpson Avenue; two long blasts of whistle followed quickly by one short blast of whistle.

(2) (Reserved)

(2-a) Riverside Avenue (Sixth Street) Bridge across Hoquiam River, Hoquiam; two long blasts of whistle followed quickly by two short blasts.

(3) Northern Pacific Railway bridge over Hoquiam River near forks of river: one long blast of whistle followed quickly by one short and one long blast.

(4) Northern Pacific Railway bridge over Wishkah River at Aberdeen: one long blast of whistle followed quickly by one short blast.

(5) State of Washington bridges over Wishkah River at Heron Street and at Wishkah Street: One long blast of whistle followed quickly by two short blasts.

§117.776 State highway bridge across Chehalis River, Aberdeen, Washington. (a) From 7:15 a.m. to 8:15 a.m. and 4:15 p.m. to 5:15 p.m., Monday through Friday, except federal holidays, the draw need not open for the passage of vessels of less than 5,000 gross tons. At all other times, the draw shall open on signal.

(b) (Reserved).

(c) The regulations set forth in §117.775(a) shall apply to this bridge.

§117.784 Hood Canal, Wash.; Washington State Department of Highways bridge near Port Gamble. (a) The owner of or agency controlling the bridge will not be required to keep a draw tender in constant attendance, except as otherwise provided in paragraph (b) (3) of this section.

(b) Whenever a vessel is unable to safely pass under either of the two fixed approach spans and desires to pass through the draw of the bridge, at least 1 hour advance notice of the time of required opening shall be given to the authorized representative of the owner of or agency controlling the bridge by any of the methods indicated below.

(1) Telephone requests for bridge opening will be directed as collect calls to the Toll Office at the bridge site. The call may also be made by direct telephone communication, through the Seattle Marine Operator, Station KOW, or through other marine wire or radio telephone service.

(2) (Reserved).

(3) During unusual or emergency periods, the authorized representative of the owner of or agency controlling the bridge will be required to operate the draw of the bridge on a demand basis for specified periods of time, which will normally not exceed 48 hours, when requested by the Department of the Navy. While on a demand basis the draw tender will be in attendance on the bridge with radio communications equipment in operation.

(c) After receipt of proper advance notice of a required opening of the drawspan the authorized representative of the owner of or agency controlling the bridge shall arrange for opening the span at the specified time. When opening of the bridge is imminent, all signals, radio or audio, will be promptly acknowledged by both the bridge and vessels desiring to pass through the draw.

(d) Communication when opening is imminent.

(1) Radio: The drawtender shall monitor and communicate with vessels on radiotelephone frequency 156.65 megahertz (Channel 13). If radio contact cannot be made on 156.65 megahertz, the drawtender shall monitor and communicate with vessels on 156.80 megahertz (Channel 16). These frequencies are subject to change by the Federal Communications Commission.

(2) (Reserved).

(e) Audio signals may be omitted when radiotelephones are used as set under paragraph (d) (1) of this section. Vessels using radiotelephone communications to request the opening of the draw shall maintain continuous radiotelephone communication with the drawtender until the vessel has completed passage through the draw.

(f) The owner of or agency controlling the bridge shall keep the provisions of the regulations in this section conspicuously posted on both the upstream and downstream sides of the bridge or elsewhere in such a manner that they can easily be read at any time.

§117.785 Tacoma Harbor, Tacoma, Washington; bridges. (a) Drawtenders and operating machinery. The owners of or agencies controlling these drawbridges shall provide the necessary drawtenders and the proper machinery for the safe, prompt opening of the draws for the passage of vessels. The draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation, unless specifically excluded from this provision elsewhere in this section.

(b) Operation of the draw. Upon receiving the opening signal from a vessel, the draw span shall be cleared of trains, vehicles, pedestrians or other material, as soon as possible, and opened with the least possible delay, unless

(1) A train is approaching so closely that it cannot be safely stopped before reaching the draw, or

(2) The draw machinery is inoperable, or

(3) Special operation regulations are in effect for that bridge which authorize the draw to remain closed at that time.

(c) Unnecessary delay prohibited. Trains, vehicles, or pedestrians shall not stop or be stopped on a drawbridge so as to delay its opening, nor shall vessels be navigated so as to hinder or delay the closure of the draw. All passages across or through a drawbridge shall be prompt to prevent delay to either land or water traffic. Passage through a draw shall be made at no greater speed than that required to maintain reasonable control of a vessel so as to minimize damage to the bridge, fenders, and/or vessel in case of collision.

(d) Posted regulations. The owner of or agency controlling each bridge shall keep conspicuously posted on both the upstream and downstream sides of the drawbridge, in such a manner that it can be easily read at any time from an approaching vessel, a brief statement of the regulations in this section pertaining to the bridge, together with information as to whom notice should be given when it is desired that the bridge be opened and directions for communicating with such person by telephone or otherwise.

(e) Operation signals. (1) Sound signals may be made by a whistle, horn, or other similar devices, and shall be sounded within reasonable hearing distance of the bridge, repeated if necessary, in time to permit appropriate response by the drawtender. Visual signals are to be used in conjunction with sound signals if weather conditions are such that sound signals may not be heard or if the prescribed audible signals cannot be sounded.

(i) Sound signals for opening of the draw:

(a) City Waterway; State of Washington highway bridge at South 11th Street: One long and one short blast.

(b) (Reserved).

(c) City Waterway; Union Pacific railroad bridge near South 15th Street: One long, one short, and one long blast.

(d) Blair Waterway; State of Washington highway bridge at East 11th Street: Two long blasts.

(e) Hylebos Waterway; State of Washington highway bridge at East 11th Street: One long and one short blast.

(ii) Visual signals for opening of the draw, applicable to all bridges listed in paragraph (e)(1)(i) of this section: A white flag by day or a white light by night, raised and lowered repeatedly in full sight of the draw.

(iii) Acknowledging signals, applicable to all bridges listed in paragraph (e)(1)(i) of this section:

(a) Draw will be opened without delay or will be opened after the end of a delay: The sound signal shall be the same as for the opening of the draw or two distinct strokes of a bell. The visual signal shall be the same as for the opening of the draw, shown in full sight of the vessel.

(b) Draw cannot be opened promptly or, if open, must be closed immediately: The sound signal shall be four or more short blasts or four or more distinct strokes of a bell sounded in rapid succession. The visual signal shall be a red flag by day or a red light by night, raised and lowered repeatedly in full sight of the vessel. These signals may be used by a vessel to countermand a signal for opening of the draw.

(iv) Fog signals. When fog prevails by day or night, the drawtender, after giving the opening signal, shall toll a bell continuously during the approach and passage of a vessel.

(f) Special operation regulations–(1) City Waterway–(i) State of Washington highway bridge at South 11th Street. (a) A drawtender need not be kept in constant attendance at this bridge. At least 2 hours advance notice of the time the opening is desired must be given to the city of Tacoma, Department of Public Works, which shall arrange for the prompt opening of the draw on proper signal at approximately the time requested. However, the draw need not be opened from 6:30 a.m. to 8:30 a.m., and 3:30 p.m. to 5:30 p.m. Monday through Friday, except national holidays, for vessels of less than 1,000 gross tons, unless such vessel has in tow a vessel of 1,000 gross tons or over, or opening of the draw is required for the pickup for towing of a vessel of 1,000 gross tons or over. Under emergency conditions, openings will be made as soon as possible by the city of Tacoma, Department of Public Works, upon application by responsible representatives of affected navigation interests.

(ii) Union Pacific Railroad bridge near South 15th Street. (a) The draw of this bridge need not be opened from 7:15 a.m. to 8 a.m., and 4:15 p.m. to 5 p.m. except when necessary to prevent disaster to shipping.

(2) Puyallup Waterway and River, Washington.

(i) (Reserved).

(ii) Chicago, Milwaukee, St. Paul and Pacific Railroad bridge. The draw shall open on signal if at least 24 hours notice is given.

(3) Blair Waterway, State of Washington highway bridge at East 11th Street and Hylebos Waterway, State of Washington highway bridge at East 11th Street. (i) The draw need not open from 6:30 a.m. to 8:30 a.m., and from 3:30 p.m. to 5:30 p.m., Monday through Friday, except federal holidays, for vessels of less than 1,000 gross tons, unless–

(A) The vessel has a vessel of 1,000 gross tons or over in tow; or

(B) The vessel is proceeding to pick up a vessel of 1,000 gross tons or over for towing.

(ii) The draw shall open as soon as possible, in an emergency situation, after notice is given to the City of Tacoma Department of Public Works.

(4) Hylebos Waterway, State of Washington highway bridge at East 11th Street. The draw need not be opened from 6:30 a.m. to 8:30 a.m., and 3:30 p.m. to 5:30 p.m. Monday through Friday, except national holidays, for vessels of less than 1,000 gross tons, unless such vessel has in tow a vessel of 1,000 gross tons over over, or opening of the draw is required for the pickup for towing of vessel of 1,000 gross tons or over. Under emergency conditions, openings will be made as soon as possible by the city of Tacoma, Department of Public Works, upon application by responsible representatives of affected navigation interests.

§117.790 Duwamish Waterway at Seattle, Washington; bridges. (a) The owners of or agencies controlling these drawbridges shall provide the necessary tenders and the proper machinery for the safe, prompt opening of the draws for the passage of vessels.

(b) Sound signals. A long blast shall be of 3 seconds duration; a short blast shall be of 1 second duration. The opening sound signals are as follows:

(1) Burlington Northern Bridge and Southwest Spokane Street Bridge, mile 0.3: One long blast followed quickly by three short blasts.

(2) Burlington Northern Bridge, mile 0.4: One long blast followed quickly by one short blast.

(3) First Avenue South Bridge, mile 2.5: Three long blasts.

(4) Fourteenth Avenue South Bridge, mile 3.8: One long blast followed quickly by one short blast and one long blast.

(c) Acknowledging Sound Signals are as follows:

(1) When the draw will open, same as opening signal.

(2) When the draw will not open or must close immediately, four short blasts, repeated until acknowledged by the vessel.

(3) As soon as the draw can open, the draw tender shall sound the opening signal.

(d) Visual Signals. Lights shall be of sufficient intensity to be readily visible at night and flags be of sufficient size to be readily visible from both the vessel and the bridge. Visual signals are as follows:

(1) From the vessel, a white light at night or a white flag by day swung in full circle at arm's length in full sight of and facing the drawbridge.

(2) When the draw of the bridge will open immediately the draw tender shall reply by vertically raising and lowering a white light at night or a white flag by day.

(3) When the draw of the bridge will not open immediately, the draw tender shall reply by swinging a red light at night or a red flag by day in full circle at arm's length in full sight of and facing the vessel. This signal may also be used by a vessel to countermand its signal to open the draw.

(e) During conditions of restricted visibility, as defined in the Rules of the Road, the draw tender, after giving the acknowledging signals that the draw will open, shall toll a bell continuously during the approach and the passage of the vessel.

(f) The draws of each bridge across the Duwamish Waterway shall open promptly on signal except that the draws of the Southwest Spokane Street bridge and the First Avenue South bridge need not open for the passage of vessels from 6:30 a.m. to 8:30 a.m. and 3:45 p.m. to 5:45 p.m., Monday through Friday, except holidays. However, the draws shall open at any time for a vessel of 5,000 tons or more.

(g) City of Seattle Southwest Spokane Street bridges and the Burlington Northern drawbridges have two-way radiotelephones. When the request for bridge opening and answering acknowledgment is given by radiotelephone, sound or visual signals are not required. Both vessel and bridge must continue to monitor the selected radiotelephone channel until the vessel has cleared the draw. If radiotelephone contact cannot be maintained, sound or visual signals shall be used.

(h) Appurtenances. The draws of the Southwest Spokane Street bridges need not open for a vessel equipped with appurtenances that can be readily lowered to enable the vessel to pass under the closed draws. If a vessel passes through the draws of the Southwest Spokane Street bridges 40 times or more in any twelve month period and is equipped with appurtenances that can be altered to enable the vessel to pass under the closed draws, the district commander, upon request of the bridge owner, may notify the vessel owner and the bridge owner of his determination of required modification and grant a reasonable time to accomplish the required modification. If after the expiration of this time, necessary modifications to the appurtenances have not been made, the draws need not open for the passage of this vessel.

§117.795 Lake Washington Ship Canal; bridges. (a) The draw of the Burlington Northern Railroad bridge at Shilshole Bay shall open on signal.

(b) The draws of the Ballard, Fremont Avenue, University and Montlake Boulevard bridges shall open on signal except that they:

(1) Need not open from 7 a.m. to 9 a.m., and from 4 p.m. to 6 p.m., Monday through Friday, except national holidays, for vessels of less than 1,000 tons unless the vessel has a vessel of over 1,000 tons in tow, except under emergency conditions when the Seattle City Engineer is notified; and

(2) Shall open on signal from 12 midnight to 8 a.m., if at least one hour notice is given by telephone, radiotelephone, or otherwise to the drawtender at the Fremont Avenue drawbridge.

(c) (Reserved).

(d) During conditions of restricted visibility, as defined in the Rules of the Road, the drawtender after giving the acknowledging signals that the draw will open, shall toll a bell continuously during the approach and passage of the vessel.

(e) The following provisions shall not relieve the owner of or agency controlling a drawbridge from opening the draw for the passage of vessels in accordance with paragraphs (a) and (b) of this section.

(1) A vessel shall not require the opening of the draw when such opening is needed only to provide additional clearance for appurtenances unessential to navigation of the vessel, or for appurtenances essential to navigation but which may be altered by hinging, telescoping, collapsing, or otherwise, so as to require no greater clearance than the highest fixed and essentially unalterable point of the vessel.

(2) Appurtenances unessential to navigation include, but are not limited to fishing outriggers, radio antennae which are or can reasonably be made flexible or collapsible, television antennae, false stacks, and masts purely for ornamental purposes. Appurtenances unessential to navigation do not include radar antennae, flying bridges, sailboat masts, piledriver leads, spud frames on hydraulic dredges, drilling derricks, derrick substructures and/or buildings, cranes on drilling or construction vessels, or other items of permanent and fixed equipment clearly necessary to the intended use of the vessel.

(3) The owners of, or agencies controlling the drawbridges, shall report to the District Commander in charge of the locality, the names of any vessels causing bridge openings considered to be in violation of this paragraph. The District Commander may at any time cause an inspection to be made of any craft so reported and is empowered to decide in each case whether or not the appurtenances are unessential to navigation. If the District Commander decides a vessel has appurtenances unessential to navigation, he notifies the vessel owner of his decision, specifying a reasonable time for making necessary alterations. If the vessel owner is aggrieved by the decision of the District Commander, he may within 30 days after receipt of the request to perform necessary alterations appeal the decision to the Commandant in writing. If the Commandant rules that an appurtenance is unessential to navigation, the District Commander again specifies to the vessel owner a reasonable time for making necessary alterations to the appurtenance, and after the expiration of the time specified, any operation of the vessel in such a manner as to require drawbridge openings is deemed to be in violation of the regulations of this paragraph unless the necessary alterations have been made.

(f) All non-self-propelled vessels, crafts, or rafts, navigating the Lake Washington Ship Canal, for which the opening of any bridge may be necessary, shall, while passing such bridge, be towed by a suitable self-propelled vessel.

§117.800 Lake Washington, Wash.; pontoon bridge between Seattle and Mercer Island, Wash. (a) The owners of or agencies controlling the drawbridge shall provide the appliances and personnel necessary for the safe, prompt, and efficient operation of the draw.

(b) (Reserved).

(c) Automobiles, trucks, or other vehicles shall not be stopped on the draw of the bridge, except in cases of urgent necessity, nor shall vessels or other watercraft be manipulated in a manner hindering or delaying the operation of the draw. All passage over the draw or through the draw opening shall be prompt, in order to prevent delay to either land or water traffic.

(d) All vessels, craft, or rafts, not self-propelled, navigating Lake Washington, for which the opening of the bridge may be necessary, shall, while passing the bridge, be towed by a suitable self-propelled boat.

(e) Upon the signal prescribed in paragraph (b) of this section being given, the draw shall be opened promptly for the passage of any vessel, or vessels, or other water craft not able to pass through the openings under the fixed spans of the pontoon bridge near each shore, or under the spans of the fixed bridge on the east side of Mercer Island:

(1) Provided, That the draw need not open from 6:30 a.m. to 9:30 a.m. and from 3 p.m. to 6:30 p.m., Monday through Friday, except holidays, for any vessel of less than 2,000 gross tons, unless such vessel has in tow a vessel of 2,000 gross ton or over, or a pile driver that is unable to pass the fixed spans, and

(2) Provided further, That the bridge need not be opened at any time for the passage of any vessel of less than 300 gross tons equipped with a movable stack or mast which can readily be lowered so as to permit its passage under the fixed spans, unless it has in tow a vessel which is unable to pass under the fixed spans. Any vessel of less than 300 gross tons regularly navigating the lake shall be subject to inspection and measurement by the District Commander who is hereby empowered to decide in each case whether or not the vessel shall be equipped with hinged or movable stacks, masts and flagpoles which can be lowered to enable the vessel to pass under the fixed spans. If the District Commander decides that such action should be taken, he shall notify the vessel owner and the bridge owner of his decision, specifying a reasonable time for making the alterations; and after the expiration of the time specified, the draw need not be opened for the passage of such vessel unless it has in tow a vessel unable to pass under the fixed spans; and

(3) Provided further, That the bridge will not be required to be opened at any time for any craft towing logs or scows, after the owners of the bridge shall have provided fenders, approved by the Commandant at the openings under the approach span of the pontoon bridge, adjacent to Mercer Island, and under the main span of the fixed bridge between Mercer Island and the mainland east of Lake Washington, unless such craft cannot pass under those spans; and

(4) Provided further, That when the draw shall have been opened for ten minutes, or for such shorter period as may have been necessary for the passage of vessels, or other watercraft, desiring to pass, it shall be closed for the crossing of vehicles or individuals, if any be waiting to cross, and after being so closed for ten minutes, or for such shorter time as may be necessary for the said vehicles or individuals to cross, it shall again be opened promptly for the passage of vessels or other watercraft, if there be any such desiring, and authorized herein, to pass at such time; and

(5) Provided further, That, at night, between the hours of 9 p.m. and 5 a.m., the draw shall be opened for the passage of all vessels that cannot pass under the fixed spans upon notice given by telephone or otherwise to the bridge operator at least 30 minutes in advance of the time that the vessel desires to pass through the draw.

(f) (Reserved)

(g) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such a manner that it can be easily read at any time, a copy of the regulations in this section, together with a notice stating exactly how the bridge operator specified in paragraph (e) of this section may be reached.

§117.801 Lake Washington, Wash.; pontoon bridge between Foster Island and Evergreen Point, Wash. (a) The owner of or agency controlling the bridge will not be required to keep a draw tender in constant attendance.

(b) Whenever a vessel is unable to safely pass under either of the two fixed approach spans and desires to pass through the draw of the bridge, at least one hour advance notice of the time of required opening shall be given to the authorized representative of the owner of or agency controlling the bridge by any of the methods indicated below.

(1) Telephone requests for bridge opening will be directed as collect calls to the Highway Radio. The call may also be made by direct telephone communication, through the Seattle Marine Operator, Station KOH, or through other marine wire or radiotelephone service.

(2) (Reserved).

(c) After receipt of proper advance notice of a required opening of the drawspan the authorized representative of the owner of or agency controlling the bridge shall arrange for opening the span at the specified time. When opening of the bridge is imminent, all signals will be promptly acknowledged by both the bridge and vessels desiring to pass through the draw.

(d) Automobiles, trucks, or other vehicles shall not be stopped on the draw of the bridge, except in cases of urgent necessity, nor shall vessels or other watercraft be manipulated in a manner hindering or delaying the operation of the draw. All passage over the draw or through the draw opening shall be prompt, in order to prevent delay to either land or water traffic.

(e) All vessels, craft, or rafts, not self-propelled, navigating Lake Washington, for which the opening of the bridge may be necessary, shall while passing the bridge, be towed by a suitable self-propelled boat.

(f) The bridge will not be required to open on week days between the hours of 7:00 a.m. and 9:00 a.m. and 4:00 p.m. and 6:00 p.m. for any vessel or other watercraft of less than 2,000 gross tons, unless such vessel has in tow a vessel of 2,000 gross tons or over, or a piledriver that is unable to pass under the fixed spans.

(g) The bridge need not be opened at any time for the passage of any vessel of less than 300 gross tons equipped with a movable stack or mast which can readily be lowered so as to permit its passage under the fixed spans, unless it has in tow a vessel which is unable to pass under the fixed spans. Any vessel of less than 300 gross tons regularly navigating the lake shall be subject to inspection and measurement by the District Commander who is hereby empowered to decide in each case whether or not the vessel shall be equipped with hinged or movable stacks, masts and flagpoles which can be lowered to enable the vessel to pass under the fixed spans. If the District Commander decides that such action should be taken, he shall notify the vessel owner and the bridge owner of his decision, specifying a reasonable time for making the alterations; and after the expiration of the time specified, the draw need not be opened for the passage of such vessel unless it has in tow a vessel unable to pass under the fixed spans.

(h) When the draw shall have been opened for ten minutes, or for such shorter period as may have been necessary for the passage of vessels, or other watercraft, desiring to pass, it shall be closed for the crossing of vehicles or individuals, if any be waiting to cross, and after being so closed for ten minutes, or for such shorter time as may be necessary for the said vehicles or individuals to cross, it shall again be opened promptly for the passage of vessels or other watercraft, if there be any such desiring, and authorized herein, to pass at such time.

(i) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such a manner that it can easily be read at any time, a copy of the regulations in this section.

§117.805 Snohomish River, Steamboat Slough, and Ebey Slough, Wash.; bridges. (a) Draw tenders and operating machinery. The owners of or agencies controlling drawbridges shall provide the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draws for the passage of vessels in accordance with the regulations in this section. The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

(b) Signals–(1) Sound signals. To be used if weather conditions are such that sound signals can be heard.

(i) Distinctive call signals are prescribed for certain bridges as follows:

(a) Snohomish River; State of Washington Department of Highways bridges near the mouth. Three long blasts followed by one short blast (one signal opens both bridges).

(b) Steamboat Slough; Great Northern Railway Company bridge near the mouth. One long blast followed by one short blast and one long blast.

(c) Steamboat Slough; State of Washington Department of Highway bridges near the mouth. Two long blasts followed by one short blast (one signal opens both bridges).

(d) Ebey Slough; State of Washington Department of Highways bridge near the mouth. Three long blasts followed by one short blast.

(ii) Acknowledging signals–(a) When draw can be opened immediately (opening signal). Two long blasts followed by one short blast of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell.

(b) When draw cannot be opened immediately, or when it is open and must be closed immediately. Two long blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell. (This signal may also be used by a vessel to countermand its call signal.) Thereafter, as soon as the draw can be opened, the draw tender shall sound the opening signal.

(2) Visual signals. To be used if weather conditions are such that sound signals may not be heard.

(i) Call signal for opening of draw. A white flag by day or a white lighted lantern by night, swung in vertical circles at arm's length in full sight of the bridge and facing the draw.

(ii) Acknowledging signal when draw can be opened immediately (opening signal). Same as call signal, to be given in full sight of the vessel.

(iii) Acknowledging signal when draw cannot be opened immediately, or when it is open and must be closed immediately. A red flag by day or a red lighted lantern at night, swung in vertical circles at arm's length in full sight of the vessel. (This signal may also be used by a vessel to countermand its call signal.) Thereafter as soon as the draw can be opened, the draw tender shall give the opening signal.

(3) Fog signal. When fog prevails by day or by night, the draw tender, after giving the opening signal, shall toll a bell continuously during the approach and passage of the vessel.

(c) Prompt opening required except when delayed by train. Except as otherwise provided in paragraph (e) of this section, the draw shall be opened with the least possible delay on receiving the prescribed signal: Provided, That the draw shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the draw tender.

(d) Interference with operation of bridge prohibited. Trains and vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall watercraft be navigated so as to hinder or delay the operation of the draw, but all passage over or through a drawbridge shall be prompt to prevent delay to either land or water traffic.

(e) Bridges where constant attendance of draw tenders is not required. (1) The owners of or agencies controlling the bridges listed in paragraph (e)(5) of this section need not keep the draw tenders in constant attendance.

(2) Whenever a vessel, unable to pass under a closed bridge, desires to pass through the draw, advance notice, as specified, of the time the opening is required must be given to the authorized representative of the owner of or agency controlling the bridge to insure prompt opening thereof at the time required.

(3) On receipt of such advance notice, the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draw on proper signal at approximately the time specified in the notice.

(4) The owners of or agencies controlling each bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section pertaining to the bridge together with information as to whom notice should be given when it is desired that the bridge be opened and directions for communicating with such person by telephone or otherwise.

(5) The bridges to which this paragraph applies, and the special regulations applicable in each case, are as follows:

(i) Snohomish River; State of Washington Department of Highways bridges north of Everett, at least 2 hours' advance notice required: Provided, That during freshets a draw tender shall be kept in constant attendance upon order of the District Commander.

(ii) Snohomish River; State of Washington Department of Highways bridge at the foot of Hewitt Avenue, Everett. At least 4 hours' advance notice required: Provided, That during freshets a draw tender shall be kept in constant attendance upon order of the District Commander.

(iii) Steamboat Slough; bridges of Great Northern Railway Company and State of Washington Department of Highways near Marysville. At least 4 hours' advance notice required.

§117.810 Navigable waters in the State of Washington; bridges where constant attendance of draw tenders is not required. (a) The owners of or agencies controlling the bridges listed in paragraph (f) of this section will not be required to keep draw tenders in constant attendance.

(b) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice, as specified, of the time the opening is required must be given to the authorized representative of the owner of or agency controlling the bridge to insure prompt opening thereof at the time required.

(c) On receipt of such advance notice, the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draw on proper signal at approximately the time specified in the notice.

(d) The owner of or agency controlling each bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section pertaining to the bridge together with information as to whom notice should be given when it is desired that the bridge be opened and directions for communicating with such person by telephone or otherwise.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

(f) The bridges to which this section applies, and the regulations applicable in each case, are as follows:

(1) (Reserved)

(2) (Reserved)

(3) Skagit River; State of Washington highway bridge, Skagit County highway bridge, Great Northern Railway Co. bridge, and Northern Pacific Railway Co. bridge near Mount Vernon and Sedro Woolley, Wash., need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to these bridges: Provided, That they shall be returned to an operable condition within 1 year after notification by the Commandant to take such action.

(4) (Reserved.)

(5) Wishkah River; State of Washington bridges over Wishkah River at Heron Street and at Wishkah Street. The draws shall open on signal if at least one-half hour notice is given. The State Department of Highways shall accept collect telephone calls from vessels via the local marine telephone operator or long distance telephone.

(6) Hoquiam River; State Department of Highways bridge at Simpson Avenue, Hoquiam. The draw need not open unless at least one (1) hour's notice has been given. The State Department of Highways shall accept collect telephone calls from vessels via the local marine telephone operator, or long distance telephone.

(7) Chehalis River, Union Pacific Railroad bridge at South Montesano. The draw shall be maintained in the open to navigation position.

(8) (Reserved)

(9) Deep River, Wash., mile 3.5, state highway bridge one mile south of the town of Deep River. The draw shall open on signal if at least four hours notice is given.

§117.815 Pend Oreille River, Idaho; bridge of Northern Pacific Railway Co. near Sandpoint. The draw need not be opened for the passage of vessels.

§117.900 Honolulu Harbor, Hawaii; Kalihi Channel bridge. (a) The draw shall open for the passage of vessels during the scheduled hours of opening as follows:

Monday through Friday, excluding legal holidays.

Open on signal: 5:00 a.m. to 6:00 a.m.; 6:00 p.m. to 7:00 p.m.

Closed periods: 6:00 a.m. to 6:00 p.m.; 7:00 p.m. to 5:00 a.m.

(b) From 5:00 a.m. on Saturdays to 5:00 a.m. on Mondays and on legal holidays, the bridge will be opened for traffic upon six (6) hours' advance notice to the Honolulu Harbor Pilot Station at Aloha Tower. In event of emergencies during the closed periods specified in paragraph (a) of this section, the Pilot Station will be called for clearance. In the event that a seismic sea-wave (tidal wave) is imminent, the bridge shall be opened to full horizontal and vertical clearances upon orders of the Harbor Master, Port of Honolulu. Emergency ship movements or imminence of wave arrival may require the bridge to be opened even though all persons have not evacuated the Sand Island area. Every effort shall be made to keep the bridge in the down position as long as reasonably possible; however, the Harbor Master may open the bridge within thirty (30) minutes of estimated time of wave arrival if he deems it prudent.

(c) The following described visual signals shall be mounted on a mast on the bridge control tower:

(1) A flashing green light to indicate that the draw can be opened immediately. The light shall be exhibited during the time the draw is opening and until the draw is to be closed.

(2) A flashing red light to indicate that the draw cannot be opened immediately, or being opened, is to be closed immediately. The light shall be exhibited during the time the draw is closing.

(3) Two (2) amber lights in a vertical line, one over the other, 6 feet apart, with the uppermost 6 feet below the flashing red light. The uppermost amber light shall be flashing and, when exhibited, shall indicate incoming traffic only. The lowermost amber light shall be fixed, and, when exhibited, shall indicate outgoing traffic only. When both lights are exhibited, the harbor is closed to all traffic.

(4) The flashing red and green lights shall be mounted on a mast on the bridge control tower at a height of 65 feet above the water plane at mean lower low water datum, shall be visible between 50 degrees and 245 degrees true from seaward and visible for a distance of approximately 3 miles. The fixed and flashing amber lights shall conform to the bearings and visibility as prescribed for the red and green lights.

(5) In addition to the above described lights, two (2) shapes shall be exhibited from a yardarm on the mast at a distance of 60 feet above the water plane at mean lower low water datum. One shape shall be an orange ball 2 feet in diameter. The other shape shall be an orange cone 2 feet in diameter across the base.

(d) When a vessel or other watercraft intends to pass through the draw of the bridge, the master or pilot thereof shall, on approaching within signaling distance, signify his intention to pass through the draw by sounding two (2) prolonged blasts followed immediately by two (2) short blasts. If the draw can be opened immediately, the bridge tender shall exhibit the flashing green light. The orange ball will be exhibited to indicate an inbound vessel; the cone will be exhibited to indicate an outbound vessel.

During daylight hours when the drawbridge cannot be opened immediately, the bridge tender shall exhibit the flashing red light and hoist the ball and cone simultaneously to the yardarm. If for some reason the drawbridge cannot be opened after the tender has signified immediate opening by the flashing green light and either the ball or cone, he shall immediately exhibit the rescinding signal of the flashing red light and hoist the ball and cone simultaneously to the yardarm. As soon as the exigency which prevented opening has been removed, the tender shall promptly exhibit the flashing green light and either the ball or cone as the case may require to advise vessels that the drawbridge can be opened at once and he shall thereupon proceed to open the drawbridge if there is a vessel waiting to pass through. No vessel shall attempt to navigate the drawbridge when the visual signals indicate the bridge cannot be opened. During the period of darkness, when the drawbridge cannot be opened immediately, the bridge tender shall exhibit the flashing red light and the fixed and flashing amber lights simultaneously. If for any reason the draw cannot be opened after the tender has signified immediate opening by the flashing green light and either the flashing amber light or fixed amber light, he shall immediately exhibit the rescinding signal of the flashing red light and the fixed and flashing amber lights simultaneously. As soon as the exigency which prevented opening has been removed, the tender shall promptly exhibit the flashing green light and either the flashing or fixed amber lights as the case may require to advise vessels that the drawbridge can be opened at once. He shall thereupon proceed to open the drawbridge if there is a vessel waiting to pass through. No vessel shall attempt to navigate through the drawbridge when the visual signals indicate that the bridge cannot be opened.

(e) Vessels having a length greater than one hundred fifty (150) feet shall not pass through the opened bridge span at the same time going either in the same direction or approaching each other from opposite directions. When vessels having a length less than one hundred fifty (150) feet are approaching from opposite directions to pass through the bridge, each vessel shall give the call signal for opening the draw. The vessel approaching from seaward shall have the right of way. Both vessels shall then be navigated in accordance with the applicable pilot rule.

(f) Clearance gages of a type to be approved by the Commandant shall be provided and kept in good legible condition. Unless otherwise specified, such clearance gages shall consist of two board gages painted white with black figures not less than nine inches high, which shall indicate the headroom clearances under the closed center of the span at all stages of the tide. These gages shall be so placed, that they will be plainly visible to the operator of a vessel approaching the bridge either inbound or outbound, and shall be illuminated at night and during periods of decreased visibility caused by heavy rain or mist.

(g) At each opening of the draw full horizontal and vertical clearances shall be provided, regardless of the size or requirements of the passing vessel or other watercraft.

(h) The agencies controlling the bridge shall keep a complete record of all openings of the draw and shall promptly report to the District Commander all cases in which the drawspan has been required to remain open for an unreasonable length of time or to remain closed for more than 10 minutes after the prescribed signal to open the draw has been given.

(i) The length of time that a draw has been opened shall be computed from the time that the drawspan begins to move in opening, and the length of time that a draw has been closed shall be computed from the time that the drawspan ceases to move in closing.

(j) The bridge shall not be required to open for craft carrying appurtenances unessential to navigation and any vessel operator who causes the bridge to be opened in order to clear appurtenances unessential for navigation shall be considered in violation of the regulations of this section.

(k) Appurtenances unessential for navigation shall include but not be limited to fishing outriggers, radio or television antennae, false stacks, and masts purely for ornamental purposes. Appurtenances unessential to navigation will not include flying bridges, sailboat masts, pile driver leads, spud frames on hydraulic dredges, or other items of equipment clearly necessary to the intended use of the vessel.

(l) The agencies controlling the bridge shall report to the District Commander the names of any vessels requiring bridge openings considered to be in violation of this section. The District Commander may at any time cause an inspection to be made of any craft using the waterway and is empowered to decide in each case whether or not the appurtenances are unessential to navigation. If the District Commander decides a vessel has appurtenances unessential to navigation, he shall notify the vessel owner of his decision, specifying a reasonable time for making the alterations. If the vessel owner is aggrieved by the decision of the District Commander, he may within 30 days after receipt of the request to perform necessary alterations, appeal the decision to the Commandant in writing. If the Commandant rules that an appurtenance is unessential to navigation, the District Commander shall again specify to the vessel owner a reasonable time for making necessary alterations to the appurtenance, and after the expiration of the time specified, any operation of the vessel on the waterway in such a manner as to require drawbridge openings shall be deemed in violation of the regulations of this section, unless the necessary alterations shall have been made.

(m) All vessels when passing the bridge shall be moved as expeditiously as is consistent with safe navigation, and all towboats engaged in towing barges or other craft through the bridge shall be of sufficient power to handle the tow without unduly delaying the closing of the drawspan.

(n) Vessels with hinged or adjustable masts or booms projecting above their fixed structure shall lower the same and pass under the bridge, if practicable, without signaling for the draw to open.

(o) Vehicles and pedestrians shall not be stopped on the bridge for the purpose of delaying its opening, nor shall watercraft be handled so as to hinder or delay the operation of the draw, but all passage over or through the bridge shall be prompt to prevent delay to either land or water traffic.

(p) The operating machinery of the draw shall be maintained in a serviceable condition, and the draw shall be opened and closed at intervals frequent enough to make certain the machinery is in proper order for satisfactory operation.

(q) The term District Commander as used in this section shall mean the Commander, 14th Coast Guard District, Honolulu, Hawaii.

(r) The agencies controlling the bridge shall keep a legible copy of the regulations in this section posted conspicuously under glass on both the harbor and channel sides of the bridge in such manner that it can be easily read at all times.

Part 147–Safety Zones

Subpart 147.01–Purpose and Delegation

§147.01-1 Purpose of safety zones.

Safety zones may be established around artificial islands and fixed structures being constructed, maintained, or operated on the Outer Continental Shelf to promote the safety of life and property on the islands and structures, their appurtenances and attending vessels, and on the adjacent waters within the safety zones. Regulations adopted for safety zones may extend to the prevention or control of specific activities and access by vessels or persons, and include measures to protect the living resources of the sea from harmful agents. The regulations do not encompass the operating equipment or procedures used in the drilling for and production of oil, gas, or other minerals, or the transportation of oil, gas, or other minerals by pipeline except as they relate to the safety of life and property on the islands and structures and on the waters adjacent to the artificial islands and fixed structures or to the protection of the living resources of the sea within a safety zone from harmful agents.

§147.01-3 Delegation of authority.

The authority to establish safety zones and to issue and enforce safety zone regulations in accordance with the provisions of this part is delegated to district commanders. This authority may not be redelegated.

Subpart 147.03–Establishment of Safety Zones

§147.03-1 Initial action by the district commander.

Whenever it comes to the attention of the district commander that a safety zone and regulations may be required concerning an artificial island or fixed structure being constructed, maintained, or operated on the Outer Continental Shelf or its appurtenances and attending vessels, or the adjacent waters, he may initiate appropriate inquiry to determine whether a safety zone and regulations should be established. In making this determination, the district commander considers all relevant safety factors, including existing or reasonably foreseeable congestion of vessels, the presence of unusually harmful or hazardous substances, and any obstructions within 500 meters of an artificial island or fixed structure. If the district commander determines that the circumstances warrant the establishment of a safety zone and regulations he takes action as he deems necessary consistent with the provisions of this part.

§147.03-3 Procedures. (a) General. Except as provided in paragraph (b) of this section, a safety zone and necessary regulations may be established concerning any artifical island or fixed structure being constructed, maintained or operated on the Outer Continental Shelf, following publication of a notice of proposed rule making in the FEDERAL REGISTER and after interested parties have been given the opportunity to submit comments. A zone and necessary regulations may be in effect during any period when construction equipment and materials are within 500 meters of the construction site until the removal of all portions of the artificial island or fixed structure.

(b) Emergencies. A safety zone and necessary regulations may be established without public rule making procedures when the district commander determines that imminent danger exists with respect to the safety of life and property on an artificial island, or fixed structure being constructed, maintained, or operated on the Outer Continental Shelf, its appurtenances and attending vessels or adjacent waters. A safety zone and regulations may be made effective on the date the rule is published in the FEDERAL REGISTER. However, if circumstances require, they may be placed into effect immediately, followed promptly by publication in the FEDERAL REGISTER. The district commander may utilize, in addition to broadcast Notices to Mariners, Local Notices to Mariners, and Notices to Mariners, newspapers, and broadcasting stations to disseminate information concerning a safety zone and regulations pertaining thereto. The public may comment concerning the establishment of a safety zone or regulations under this paragraph. A safety zone or regulations may be modified or withdrawn, as appropriate, based on the comments received.

§147.03-5 Extent of safety zones.

A safety zone established under this part may extend to a maximum distance of 500 meters around the artificial island or fixed structure measured from each point on its outer edge or from its construction site, but may not interfere with the use of recognized sea lanes essential to navigation.

Subpart 147.05–Outer Continental Shelf (OCS) Safety Zones

§147.05-11.01 Platform GRACE safety zone, Santa Barbara Channel. (a) Description. A circle 500 meters from each point on the structure's outer edge. The position of the center of the structure is 34°10'47"N., 119°28'05"W.

(b) Regulations. No vessel may enter or remain in this safety zone except the following: (1) Vessels under 100 feet length-over-all without a tow, (2) vessels directly involved in the construction of platform GRACE, (3) vessels which normally attend platform GRACE, or (4) vessels authorized by the Commander, Eleventh Coast Guard District.

(c) Effective Date. This safety zone and its related regulations, as modified are effective on and after May 23, 1980.

§147.05-11.02 (Revoked)

§147.05-11.03 (Revoked)

§147.05-11.04 Platforms ELLY and ELLEN safety zone, Gulf of Santa Catalina. (a) Description. The area within a curved line 500 meters around the outer edge of both structures. The structures are approximately 120 meters apart. The position of the center of each structure is; Platform ELLY 33°34'57"N., 118°07'40"W.; and Platform ELLEN 33°34'57"N., 118°07'41"W.

(b) Regulations. No vessels may enter or remain in this safety zone except the following: (1) vessels involved in the construction of either Platform ELLY or ELLEN, (2) vessels which normally attend either platform ELLY or ELLEN or (3) vessels authorized by the Commander, Eleventh Coast Guard District.

Part 160–Ports and Waterways Safety

Subpart A–GENERAL

§160.1 Purpose.

Part 160 contains regulations implementing the Ports and Waterways Safety Act (33 U.S.C. 1221) and related statutes.

§160.3 Definitions.

(a) For the purpose of this part:

(1) "Captain of the Port" means the Coast Guard officer commanding a Captain of the Port zone described in 33 CFR 3, or that person's authorized representative.

(2) "Commandant" means the Commandant of the Coast Guard or that person's authorized representative.

(3) "District Commander" means the Coast Guard officer commanding a Coast Guard District described in 33 CFR 3, or that person's authorized representative.

(4) "Person" means an individual, firm, corporation, association, partnership, or governmental entity.

(5) "State" includes each of the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Canal Zone, Guam, American Samoa, the United States Virgin Islands, the Trust Territories of the Pacific Islands, the Commonwealth of the Northern Marianas Islands, and any other commonwealth, territory, or possession of the United States.

(6) "United States," when used in geographical context, means all the States thereof.

(7) "Vessel" means every description of water-

craft or other artificial contrivance used, or capable of being used, as a means of transportation on water.

Subpart B–Orders and Directions of the Captain of the Port and District Commander

§160.101 Applicability.

(a) This subpart applies to any–

(1) Vessel on the navigable waters of the United States, except as provided in paragraphs (b) and (c) of this section;

(2) Bridge or other structure on or in the navigable waters of the United States; and

(3) Land structure or shore area immediately adjacent to the navigable waters of the United States.

(b) This subpart does not apply to any vessel on the Saint Lawrence Seaway or Panama Canal.

(c) Except pursuant to international treaty, convention, or agreement, to which the United States is a party, this subpart does not apply to any foreign vessel that is not destined for, or departing from, a port or place subject to the jurisdiction of the United States and that is in–

(1) Innocent passage through the territorial sea of the United States; or

(2) Transit through the navigable waters of the United States which form a part of an international strait.

§160.106 Waterfront safety.

(a) To prevent damage to, or destruction of, any bridge or other structure on or in the navigable waters of the United States, or any land structure or shore area immediately adjacent to those waters, and to protect the navigable waters and the resources therein from harm resulting from vessel or structure damage, destruction, or loss, each District Commander or Captain of the Port may–

(1) Direct the handling, loading, unloading, storage, stowage, and movement (including the emergency removal, control, and disposition) of explosives or other dangerous articles and substances, including oil or hazardous material as those terms are defined in Section 4417a of the Revised Statutes, as amended, (46 U.S.C. 391a) on any structure on or in the navigable waters of the United States, or any land structure or shore area immediately adjacent to those waters; and

(2) Conduct examinations to assure compliance with the safety equipment requirements for structures.

§160.111 Vessel operating requirements.

(a) Each District Commander or Captain of the Port may direct any vessel to operate or anchor in the manner directed if–

(1) There is reasonable cause to believe the vessel is not in compliance with any regulation, law or treaty;

(2) The vessel does not satisfy the conditions for port entry specified in section 9 of the PWSA (33 U.S.C. 1228); or

(3) It is determined that such directive is justified in the interest of safety by reason of weather, visibility, sea conditions, port congestion, other hazardous circumstances or the condition of such vessel.

(b) Each District Commander or Captain of the Port may control vessel traffic in an area which is determined to be hazardous or under conditions of reduced visibility, adverse weather, vessel congestion, or other hazardous circumstances by issuing orders–

(1) Specifying times of vessel entry, movement, or departure to, from, within, or through ports, harbors, or other waters;

(2) Establishing vessel traffic routing schemes;

(3) Establishing vessel size, speed, draft limitation, and operating conditions; and

(4) Restricting vessel operation, in a hazardous area or under hazardous conditions, to vessels which have particular operating characteristics or capabilities which are considered necessary for safe operation under the circumstances.

§160.116 Denial of entry.

(a) Any person directly affected by an action taken under this part may request reconsideration by the Coast Guard official who is responsible for that action.

(b) Each District Commander or Captain of the Port, subject to recognized principles of international law, may deny entry into the navigable waters of the United States or to any port or place under the jurisdiction of the United States to any vessel not in compliance with the provisions of the Ports and Waterways Safety Act (33 U.S.C. 1221–32) or the regulations issued thereunder.

§160.121 Compliance with directions and orders.

(a) Each person who has notice of the terms of an order or direction issued under §160.106, §160.111, or §160.116 shall comply with that order.

§160.126 Withholding of clearance.

(a) Each District Commander or Captain of the Port may request the Secretary of the Treasury, or the authorized representative thereof, to withhold or revoke the clearance required by 46 U.S.C. 91 of any vessel, the owner or operator of which is subject to any penalties under 33 U.S.C. 1232.

§160.131 Appeals.

(a) Any person directly affected by an action taken under this part may request reconsideration by the Coast Guard official who is responsible for that action.

(b) Any person not satisfied with a ruling made under the procedure contained in paragraph (a) of this section may appeal that ruling in writing, except as allowed under paragraph (e) of this section, to the Coast Guard District Commander of the district in which the action was taken. The appeal may contain supporting documentation and evidence that the appellant wishes to have considered. If requested, the District Commander may stay the effect of the action being appealed while the ruling is being reviewed. The District Commander issues a ruling after reviewing the appeal submitted under this paragraph.

(c) Any person not satisfied with a ruling made under the procedure contained in paragraph (b) of this section may appeal that ruling in writing, except as allowed under paragraph (e) of this section, to the Chief, Office of Marine Environment and Systems, U.S. Coast Guard, Washington, D.C. 20593. The appeal may contain supporting documentation and evidence that the appellant wishes to have considered. If requested, the Chief, Office of Marine Environment and Systems, may stay the effect of the action being appealed while the ruling is being reviewed. The Chief, Marine Environment and Systems, issues a ruling after reviewing the appeal submitted under this paragraph.

(d) Any decision made by the Chief, Office of Marine Environment and Systems, under the procedure contained in paragraph (c) of this section is final agency action.

(e) If the delay in presenting a written appeal would have a significant adverse impact on the appellant, the appeal under paragraph (b) or (c) of this section may initially be presented orally. If an initial presentation of the appeal is made orally, the appellant must submit the appeal in writing within five days of the oral presentation to the Coast Guard official to whom the oral presentation was made containing, at a minimum, the basis for the appeal and a summary of the material presented orally.

Part 161–Vessel Traffic Management

Subpart A–Notifications of Arrivals, Departures, Hazardous Conditions, and Certain Dangerous Cargoes

§161.1 Applicability and exceptions to applicability.

(a) This subpart prescribes notification requirements for U.S. and foreign vessels bound for or departing from ports or places in the United States.

(b) This subpart does not apply to boats under the Federal Boat Safety Act of 1971 (46 U.S.C. 1451, et seq.) and, except §161.15, does not apply to passenger and supply vessels when they are employed in the exploration for or in the exploitation of oil, gas, or mineral resources on the continental shelf.

(c) Sections 161.7 and 161.9 do not apply to the following:

(1) Each vessel of less than 1600 gross tons.

(2) Each vessel operating exclusively within a Captain of the Port zone.

(3) Each vessel operating upon a route that is described in a schedule that is submitted to the Captain of the Port for each port or place of destination listed in the schedule at least 24 hours in advance of the first date and time of arrival listed on the schedule and contains–

(i) Name, country of registry, and call sign or official number of the vessel;

(ii) Each port or place of destination; and

(iii) Dates and times of arrivals and departures at those ports or places.

(4) Each vessel arriving at a port or place under force majeure.

(5) Each vessel entering a port of call in the United States in compliance with the Automated Mutual Assistance Vessel Rescue System (AMVER).

(6) Each vessel entering a port of call in the United States in compliance with the U.S. Flag Merchant Vessel Locator Filing System (USMER).

(7) Each barge.

(8) Each public vessel.

(9) United States or Canadian flag vessels, except tank vessels or vessels carrying certain dangerous cargo, which operate solely on the Great Lakes.

(d) Sections 161.7, 161.11, and 161.13 apply to each vessel upon the waters of the Mississippi River between its mouth and mile 235, Lower Mississippi River, above Head of Passes. Sections 161.7, 161.11, and 161.13 do not apply to each vessel upon the waters of the Mississippi River between its source and mile 235, above Head of Passes, and all the tributaries emptying thereinto and their tributaries, and that part of the Atchafalaya River above its junction with the Plaquemine-Morgan City alternate waterway, and the Red River of the North.

§161.3 Definitions.

As used in this subpart:

"Agent" means any person, partnership, firm, company or corporation engaged by the owner or charterer of a vessel to act in their behalf in matters concerning the vessel.

"Carried in bulk" means a commodity that is loaded or carried on board a vessel without containers or labels and received and handled without mark or count.

"Certain dangerous cargo" includes any of the following:

(a) Class A explosives, as defined in 46 CFR 146.20-7 and 49 CFR 173.53.

(b) Oxidizing materials or blasting agents for which a permit is required under 49 CFR 176.415.

(c) Large quantity radioactive material, as defined in 49 CFR 173.389(b), or Fissile Class III shipments of fissile radioactive material, as defined in 49 CFR 173.389(a)(3).

(d) Each cargo under Table 1 of 46 CFR 153 when carried in bulk.

(e) Any of the following when carried in bulk:

Acetaldehyde
Ammonia, anhydrous
Butadiene
Butane
Butene
Butylene Oxide
Chlorine
Ethane
Ethylene
Ethylene Oxide
Methane
Methyl Acetylene, Propadiene Mixture, Stabilized
Methyl Bromide
Methyl Chloride
Phosphorous, elemental
Propane
Propylene

Sulfur Dioxide
Vinyl Chloride

"Great Lakes" means Lakes Superior, Michigan, Huron, Erie, and Ontario, their connecting and tributary waters, the Saint Lawrence River as far east as Saint Regis, and adjacent port area.

"Hazardous condition" means any condition that could adversely affect the safety of any vessel, bridge, structure, or shore area or the environmental quality of any port, harbor, or navigable water of the United States. This condition could include but is not limited to, fire, explosion, grounding, leakage, damage, illness of a person on board, or a manning shortage.

"Port or place of departure" means any port or place in which a vessel is anchored or moored.

"Port or place of destination" means any port or place to which a vessel is bound to anchor or moor.

"Public vessel" means a vessel owned by and being used in the public service of the United States. This definition does not include a vessel owned by the United States and engaged in a trade or commercial service or a vessel under contract or charter to the United States.

"Vessel" includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water.

§161.5 Waivers.

The Captain of the Port may waive, within that Captain of the Port's designated zone, any of the requirements of this subpart for any vessel or class of vessels upon finding that the vessel, route, area of operations, conditions of the voyage, or other circumstances are such that application of this subpart is unnecessary or impractical for purposes of safety, environmental protection, or national security.

§161.7 Notice of arrival: Vessels bound for ports or places in the United States.

(a) The owner, master, agent or person in charge of a vessel on a voyage of 24 hours or more shall report under paragraph (c) of this section at least 24 hours before entering the port or place of destination.

(b) The owner, master, agent, or person in charge of a vessel on a voyage of less than 24 hours shall report under paragraph (c) of this section before departing the port or place of departure.

(c) The Captain of the Port of the port or place of destination in the United States must be notified of:

(1) The name and country of registry of the vessel;

(2) The name of the port or place of departure;

(3) The name of the port or place of destination; and

(4) The estimated time of arrival at the port or place.

If the estimated time of arrival changes by more than six hours from the latest reported time, the Captain of the Port must be notified of the correction as soon as the change is known.

§161.11 Notice of arrival: Vessels carrying certain dangerous cargo.

(a) The owner, master, agent, or person in charge of a vessel, except a barge, bound for a port or place in the United States carrying a certain dangerous cargo shall notify the Captain of the Port of the port or place of destination at least 24 hours before entering that port or place of-

(1) The name and country of registry of the vessel;

(2) The location of the vessel at the time of the report;

(3) The name of each certain dangerous cargo carried;

(4) The amount of each certain dangerous cargo carried;

(5) The stowage location of each certain dangerous cargo;

(6) The operational condition of the equipment under 33 CFR 164.35;

(7) The name of the port or place of destination; and

(8) The estimated time of arrival at that port or place.

If the estimated time of arrival changes by more than six hours from the latest reported time, the Captain of the Port must be notified of the correction as soon as the change is known.

(b) The owner, master, agent, or person in charge of a barge bound for a port or place in the United States carrying certain dangerous cargo shall report the information required in paragraph (a)(1) through (a)(8) of this section to the Captain of the Port of the port or place of destination at least 4 hours before entering that port or place.

§161.13 Notice of departure: Vessels carrying certain dangerous cargo.

(a) The owner, master, agent, or person in charge of a vessel, except a barge, departing from a port or place in the United States for any other port or place and carrying a certain dangerous cargo shall notify the Captain of the Port of the port or place of departure at least 24 hours before departing, unless this notification was made within 2 hours after the vessel's arrival of:

(1) The name and country of the registry of the vessel;

(2) The name of each certain dangerous cargo carried;

(3) The amount of each certain dangerous cargo carried;

(4) The stowage location of each certain dangerous cargo carried;

(5) The operational condition of the equipment under 33 CFR 164.35;

(6) The name of the port or place of departure; and

(7) The estimated time of departure from the port or place.

If the estimated time of departure changes by more than six hours from the latest reported time, the Captain of the Port must be notified of the correction as soon as the change is known.

(b) The owner, master, agent, or person in charge of a barge departing from a port or place in the United States for any other port or place and carrying certain dangerous cargo shall report the information required in paragraph (a)(1) through (a)(7) of this section to the Captain of the Port of the port or place of departure at least 4 hours before departing unless this report was made within 2 hours after the barge's arrival.

§161.15 Notice of hazardous conditions.

Whenever there is a hazardous condition on board a vessel, the owner, master, agent, or person in charge shall immediately notify the Captain of the Port of the port or place of destination and the Captain of the Port of the port or place in which the vessel is located of the hazardous condition.

Subpart B–Vessel Traffic Services

Puget Sound Vessel Traffic Service

GENERAL RULES

§161.101 Purpose and applicability.

(a) Sections 161.100 through 161.199 prescribe rules for vessel operation in the Puget Sound Vessel Traffic Service Area (VTS Area) to prevent collisions and groundings and to protect the navigable waters of the VTS Area from environmental harm resulting from collisions and groundings.

(b) The General Rules in §§161.101–161.111 and the TSS Rules in §§161.150–161.154 and §161.156 (b) and (c) apply to the operation of all vessels.

(c) The Communications Rules in §§161.120–161.136, the Vessel Movement Rules in §161.142, the TSS Rule in §161.156(a), the Vessel Speed and Wake Control Rule in §161.157, and the Rosario Strait Rules in §§161.170–161.174 apply only to the operation of–

(1) Each vessel of 300 or more gross tons that is propelled by machinery;

(2) Each vessel of 100 or more gross tons that is carrying one or more passengers for hire;

(3) Each commercial vessel of 26 feet or over in length engaged in towing another vessel astern, alongside, or by pushing ahead; and

(4) Each dredge and floating plant.

(5) Each small passenger carrying vessel certificated in accordance with 46 CFR 175 through 187 (Subchapter T) when carrying more than six passengers.

§161.103 Definitions.

As used in §161.100 through §161.199–

"Displacement ton" means the weight of water displaced by a vessel expressed in tons of 2,240 pounds.

"ETA" means estimated time of arrival.

"Person" includes an individual, firm, corporation, association, partnership, and governmental entity.

"Precautionary Area" means an area of the TSS at the entrance of one or more traffic lanes where vessel traffic converges from two or more directions.

"Separation Zone" means an area of the TSS that is located between two traffic lanes to keep vessels proceeding in opposite directions a safe distance apart.

"Traffic lane" means an area of the TSS in which all vessels ordinarily proceed in the same direction.

"Traffic Separation Scheme" (TSS) means the network of traffic lanes, separation zones, and precautionary areas in the VTS Area.

"Vessel Traffic Center" (VTC) means the shore based facility that operates the Puget Sound Vessel Traffic Service.

"Vessel Traffic Service Area" (VTS Area) means the area described in §161.180.

§161.104 Vessel operation in the VTS Area.

No person may cause or authorize the operation of a vessel in the VTS Area contrary to the rules contained in §§161.100 through 161.199.

§161.105 Laws and regulations not affected.

Nothing in §§161.100 through 161.199 is intended to relieve any person from complying with–

(a) The Navigation Rules for Harbors, Rivers, and Inland Waters Generally (33 U.S.C. §§151–232);

(b) Vessel Bridge-to-Bridge Radiotelephone Regulations (Part 26 of this chapter);

(c) Pilot Rules for Inland Waters (33 CFR 80);

(d) Puget Sound gill net fishing rule (33 CFR 206.93);

(e) The Federal Boat Safety Act of 1971 (46 U.S.C. 1451–1489); and

(f) International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS).

(g) Any other applicable laws or regulations.

§161.107 VTC directions.

(a) During conditions of vessel congestion, adverse weather, reduced visibility, or other hazardous circumstances in the VTS Area, the VTC may issue directions to control and supervise traffic, and may specify times when vessels may enter, move within or through, or depart from ports, harbors, or other waters in the VTS Area.

(b) The master of a vessel in the VTS Area shall comply with each direction issued to him under this section.

§161.109 Authorization to deviate from these rules.

(a) The Commander, Thirteenth Coast Guard District may upon request issue an authorization to deviate from any rule in §§161.100 through 161.199 if he finds that the proposed operations under the authorization can be done safely. An application for an authorization must state the need for the authorization and describe the proposed operations.

(b) The VTC may, upon request, issue an authorization to deviate from any rule in §§161.100 through 161.199 for a voyage or part of a voyage on which a vessel is embarked or about to embark.

§161.111 Emergencies.

In an emergency, any person may deviate from any provision contained in §§161.100 through 161.199 for a voyage or part of a voyage on which a vessel is embarked or about to embark.

COMMUNICATION RULES

§161.120 Radio listening watch.

The master of a vessel in the VTS Area shall continuously monitor the radio frequency designated in the current edition of the Puget Sound VTS Operating Manual for the sector of the VTS Area in which the vessel is operating, except when transmitting on that frequency.

§161.122 Radiotelephone equipment.

Each report required by §§161.100 through 161.199 to be made by radiotelephone must be made using a radiotelephone that is capable of operation on the navigational bridge of the vessel, or in the case of a dredge, at its main control station.

§161.124 English language.

Each report required by §§161.100 through 161.199 must be made in the English language.

§161.126 Time.

Each report required by §§161.100 through 161.199 must specify time using–

(a) The zone time in effect in the VTS Area; and

(b) The 24-hour clock system.

§161.128 Initial report.

Except as provided in §161.129, at least 15 minutes before a vessel enters or begins to navigate in the VTS Area the master of the vessel shall report, or cause to be reported, the following information to the VTC:

(a) Name and type of the vessel.

(b) Position of the vessel.

(c) Estimated time of entering or beginning to navigate in the VTS Area.

(d) Destination in the VTS Area.

(e) ETA of the vessel at its destination.

(f) Anticipated vessel speed in knots while in the VTS Area.

(g) Whether or not the vessel intends to use the TSS.

(h) If the vessel is a towing vessel, the overall length of the tow including the towing vessel.

(i) Whether or not any dangerous cargo listed in §124.14 of this chapter is on board the vessel or its tow.

(j) Any impairment to the operation of the vessel as described in §161.135(a) and (b).

§161.129 Local harbor report.

(a) When a vessel moves within a three mile radius of its point of departure in the VTS Area, the movement is a local harbor movement. A vessel making a local harbor movement is exempted from the reporting requirements in §§161.128 and 161.131.

(b) At least 5 minutes, but not more than 45 minutes, before a vessel makes a local harbor movement under paragraph (a) of this section, the master shall report, or cause to be reported, the following information to the VTC:

(1) Name and type of vessel.

(2) Position of departure.

(3) Time of departure.

(4) Destination and ETA.

(5) General description of operation to be performed.

(c) The master shall report, or cause to be reported, any changes from the information reported under paragraph (b) of this section, except that departing or ETA times must be reported only if they vary by 15 minutes or more from the report.

§161.131 Final report.

(a) Whenever a vessel anchors, moors in, or departs from the VTS Area the master shall report, or cause to be reported, the place and time of anchoring, mooring, or departing to the VTC.

(b) The report required in paragraph (a) of this section may be made up to 60 minutes before anchoring, mooring, or departing the VTS Area, if the vessel is not in and will not be in the TSS after making the report.

(c) If the report in paragraph (b) of this section is made, the master shall report, or cause to be reported, the revised estimated time of action immediately if it varies by 15 minutes or more from the report.

§161.133 Radio failure.

Whenever a vessel's radiotelephone equipment fails-

(a) Before entering or while underway in the VTS Area-

(1) Compliance with §§161.120 and 161.142 is not required; and

(2) Compliance with §§161.128 and 161.131 is not required unless the reports can be made by other means;

(b) Before getting underway in the VTS Area permission to get underway must be obtained from the VTC; and

(c) The master shall restore the radiotelephone to operating condition as soon as possible.

§161.134 Report of emergency or radio failure.

Whenever the master of a vessel deviates from any provision in §§161.100 through 161.199 because of an emergency or radio failure, he shall report, or cause to be reported, the deviation to the VTC as soon as possible.

§161.135 Report of impairment to the operation of the vessel.

The master of a vessel in the VTS Area shall report to the VTC as soon as possible.

(a) Any condition on the vessel that may impair its navigation such as fire or defective propulsion machinery, steering equipment, radar, gyrocompass, echo depth sounding device, or communications equipment.

(b) Any tow that the towing vessel is unable to control, or can control only with difficulty, unless this information has already been reported.

§161.136 Ferry vessels.

(a) A ferry vessel operating in the VTS Area on a schedule and a route both of which have been previously furnished to the VTC, need not comply with §§161.128, 161.131 and 161.142. However, each ferry vessel must report the following information to the VTC within five minutes of each departure from a ferry terminal:

(1) The name of the ferry vessel.

(2) Time and point of departure of the ferry vessel.

(3) Destination of the ferry vessel.

(b) The master of a ferry vessel that enters the TSS at any place other than Rosario Strait between sunset and sunrise or during reduced visibility shall report the following information by radiotelephone to the VTC at least five minutes before entry:

(1) The name of the vessel.

(2) The direction the vessel will proceed in the TSS.

(3) The point of entering the TSS.

(4) The estimated time the vessel will operate in the TSS.

VESSEL MOVEMENT REPORTING RULES

§161.142 Movement reports.

(a) The master of a vessel shall report, or cause to be reported, the following information to the VTC by radiotelephone:

(1) Any increase or decrease in speed of more than one knot.

(2) The intent to cross through the TSS at least 10 minutes before beginning to cross the TSS.

(3) When the vessel clears the TSS after crossing.

(b) When directed by the VTC, and when the vessel passes a reporting point listed in §161.189, the master of a vessel shall report, or cause to be reported, the following information to the VTC by radiotelephone:

(1) The name of the vessel.

(2) The reporting point.

TRAFFIC SEPARATION SCHEME RULES

§161.150 Vessel operation in the TSS.

The master of a vessel in the TSS shall operate the vessel in accordance with the TSS rules prescribed in §§161.152–161.156.

§161.152 Direction of traffic.

(a) A vessel proceeding in a traffic lane shall keep the separation zone to port.

(b) A vessel in a precautionary area, except the Port Angeles precautionary area or any temporary precautionary area, shall keep the center of the precautionary area to port.

§161.154 Anchoring in the TSS.

No vessel may anchor in the TSS.

§161.156 Joining, leaving, and crossing a traffic lane.

(a) A vessel may join, cross, or leave a traffic lane only at a precautionary area unless the VTC has been notified of the point at which the vessel will join, cross, or leave the traffic lane.

(b) A vessel crossing a traffic lane shall, to the extent possible, maintain a course that is perpendicular to the direction of the flow of traffic in the traffic lane.

(c) A vessel joining or leaving a traffic lane shall steer a course to converge on or diverge from the direction of traffic flow in the traffic lane at as small an angle as possible.

§161.157 Vessel speed and wake control.

When the tide exceeds a stage of 11.0 feet at Seattle, all vessels listed in §161.101(c), operating in the waters of the VTS Area, must proceed at a speed that will minimize the risk of wake damage while maintaining the ability to maneuver safely.

ROSARIO STRAIT RULES

§161.170 Communications in Rosario Strait.

Before a vessel meets, overtakes, or crosses ahead of any vessel in Rosario Strait, the master shall transmit the intentions of his vessel to the master of the other vessel on the frequency designated under the Bridge-to-Bridge Radiotelephone Act for the purpose of arranging safe passage.

§161.172 Report before entering Rosario Strait.

At least 15 minutes before a vessel enters the TSS at Rosario Strait, the master of the vessel shall report the vessel's ETA at, and point of entry in, Rosario Strait to the VTC by radiotelephone.

§161.174 Entering Rosario Strait.

(a) A vessel may not enter Rosario Strait unless–

(1) The report required by §161.172 has been made;

(2) The radio equipment on the vessel that is used to transmit the reports required by §§161.100 through 161.199 is in operation;

(3) During periods of visibility of 2 miles or less, the radar on a vessel equipped with radar is in operation and manned; and

(4) The vessel is free of any conditions that may impair its navigation such as fire, defective propulsion machinery, steering equipment, radar, gyrocompass, echo depth sounding device, or internal communications equipment.

(b) A vessel of 75,000 DWT or above may not enter Rosario Strait unless permission to enter is obtained from the VTC.

DESCRIPTIONS AND GEOGRAPHIC COORDINATES

§161.180 VTS Area.

The VTS Area consists of the navigable waters of the United States which are inside of a line drawn from New Dungeness Light northerly to Puget Sound Traffic Entrance Lighted Buoy "S"; thence to Rosario Strait Traffic Lane Entrance Lighted Buoy "R"; thence to Hein Bank Lighted Bell Buoy; thence to Cattle Point Light, on San Juan Island; thence along the shoreline to Lime Kiln Light; thence to Kellett Bluff Light on Henry Island; thence to Turn Point Light on Stuart Island; thence to Shipjack Island Light; thence to Sucia Island Daybeacon 1; thence along the shoreline of Sucia Island to a point at latitude 48°46.1'N., longitude 122°53.3'W.; thence to Clements Reef Buoy "2"; thence to Alden Bank Lighted Gong Buoy "A"; thence northerly to the westernmost tip of Birch Point at latitude 48°56.6'N., longitude 122°49.2'W.

Note.–The line described above coincides with the COLREGS Demarcation Lines described in §§80.1385 and 80.1390.

§161.183 Separation zones.

(a) Each separation zone is 500 yards wide and centered on a line that extends from one point to another, or through several points, described in paragraph (c) of this section.

(b) Two boundaries of each separation zone are parallel to its centerline and extend to and intersect with the boundary of a precautionary area. No part of any separation zone is contained in a precautionary area.

(c) The latitudes and longitudes describing the centerline of the separation zone are:

(1) Between precautionary area "S" and "SA",

(i) 48°12'22"N., 123°06'30"W.

(ii) 48°11'37"N., 122°52'44"W.

(2) Between precautionary area "R" and "RA",

(i) 48°16'26"N., 123°06'30"W.

(ii) 48°19'06"N., 123°00'09"W.

(3) Between precautionary area "RA" and "SA",

(i) 48°18'45"N., 122°57'30"W.

(ii) 48°13'04"N., 122°51'24"W.

(4) Between precautionary area "RA" and "RB",

(i) 48°20'26"N., 122°57'01"W.

(ii) 48°24'14"N., 122°48'00"W.

(iii) 48°25'28"N., 122°46'23"W.

(5) Between precautionary area "RB" and "SA",

(i) 48°25'12"N., 122°44'40"W.

(ii) 48°24'10"N., 122°44'12"W.

(iii) 48°13'22"N., 122°48'55"W.

(6) Between precautionary area "SA" and "SC",

(i) 48°10'48"N., 122°46'58"W.

(ii) 48°06'48"N., 122°39'36"W.

(iii) 48°02'28"N., 122°38'20"W.

(7) Between precautionary area "SC" and "SE",

(i) 48°01'20"N., 122°37'37"W.

(ii) 47°57'53"N., 122°34'42"W.

(iii) 47°55'46"N., 122°30'14"W.

(8) Between precautionary area "SE" and "SF",

(i) 47°54'49"N., 122°29'17"W.

(ii) 47°46'31"N., 122°26'23"W.

(9) Between precautionary area "SF" and "SG",

(i) 47°45'19"N., 122°26'21"W.

(ii) 47°40'19"N., 122°27'38"W.

(10) Between precautionary area "SG" and "T",

(i) 47°39'05"N., 122°27'42"W.

(ii) 47°35'12"N., 122°27'06"W.

(11) Between precautionary area "T" and "TC",

(i) 47°33'59"N., 122°26'47"W.

(ii) 47°26'53"N., 122°24'12"W.

(iii) 47°23'07"N., 122°21'08"W.

(iv) 47°19'54"N., 122°26'37"W.

(12) Between precautionary area "CA" and "C",

(i) 48°44'15"N., 122°45'39"W.

(ii) 48°41'39"N., 122°43'34"W.

Note: The southbound lane of the traffic separation scheme described by paragraphs (c)(6)(i) and (6)(ii) is widened at its entrance from precautionary area "SA" by a line bearing 120.0°T from a point at the edge of precautionary area "SA" at latitude 48°10'04"N., longitude 122°47'41"W. to the point of first intersection with the southbound lane at latitude 48°09'14"N., longitude 122°45'30"W.

§161.185 Traffic lanes.

(a) Except as provided in paragraph (c) of this section, each traffic lane consists of the area within two parallel boundaries that are 1000 yards apart and that extend to and intersect with the boundary of a precautionary area. One of these parallel boundaries is parallel to and 250 yards from the centerline of a separation zone.

(b) No part of any traffic lane is contained in a precautionary area.

(c) The traffic lane in Rosario Strait consists of the area enclosed by a line beginning at latitude 48°26'50"N., longitude 122°43'27"W.; thence northerly to latitude 48°36'06"N., longitude 122°44'56"W.; thence northeasterly to latitude 48°39'18"N., longitude 122°42'42"W.; thence westerly and northwesterly along the boundary of precautionary area "C" to latitude 48°39'37"N.; longitude 122°43'58"W.; thence southerly to latitude 48°38'24"N., longitude 122°44'08"W.; thence southwesterly to latitude 48°36'08"N., longitude 122°45'44"W.; thence southerly to latitude 48°29'30"N., longitude 122°44'41"W.; thence southwesterly to latitude 48°27'37"N., longitude 122°45'27"W.; thence northeasterly and southeasterly along the boundary of precautionary area "RB" to the point of beginning.

§161.187 Precautionary areas.

The precautionary areas consist of:

(a) Port Angeles precautionary area. An area enclosed by a line beginning on the shoreline at New Dungeness Spit at latitude 48°11'00"N., longitude 123°06'30"W.; thence due north to latitude 48°17'10"N., longitude 123°06'30"W.; thence southwesterly to latitude 48°10'00"N., longitude 123°27'38"W.; thence due south to the shorelines; thence along the shoreline to the point of beginning.

(b) Precautionary area "RA". A circular area of 2,500 yards radius centered at latitude 48°19'46"N., longitude 122°58'34"W.;

(c) Precautionary area "RB". A circular area of 2,500 yards radius centered at latitude 48°26'24"N., longitude 122°45'12"W.;

(d) Precautionary area "C". A circular area of 2,500 yards radius centered at latitude 48°40'34"N., longitude 122°42'44"W.;

(e) Precautionary area "CA". A circular area of 2,500 yards radius centered at latitude 48°45'19"N., longitude 122°46'26"W.;

(f) Precautionary area "SA". A circular area of 4,000 yards radius centered at latitude 48°11'28"N., longitude 122°49'43"W.;

(g) Precautionary area "SC". A circular area of 1,250 yards radius centered at latitude 48°01'52"N., longitude 122°38'05"W.;

(h) Precautionary area "SE". A circular area of 1,250 yards radius centered at latitude 47°55'25"N., longitude 122°29'29"W.;

(i) Precautionary area "SF". A circular area of 1,250 yards radius centered at latitude 47°45'55"N., longitude 122°26'11"W.;

(j) Precautionary area "SG". A circular area of 1,250 yards radius centered at latitude 47°39'42"N., longitude 122°27'48"W.;

(k) Precautionary area "T". A circular area of 1,250 yards radius centered at latitude 47°34'34"N., longitude 122°27'00"W.;

(l) Precautionary area "TC". A circular area of 1,250 yards radius centered at latitude 47°19'30"N., longitude 122°27'19"W.

§161.188 Temporary precautionary areas.

The Commander, Thirteenth Coast Guard District, may amend the description of the TSS in §§161.180–161.189 to establish temporary precautionary areas to provide for seasonal activities such as fishing that affect the safe passage of vessels in the TSS.

§161.189 Reporting points.

The reporting points are-

(a) When North of New Dungeness Light-Buoy R at latitude 48°16'26"N., longitude 123°06'30"W.

(b) When Northeast of Colville Point-Buoy RB at latitude 48°26'24"N., longitude 122°45'12"W.

(c) When Northeast of Lawrence Point-Buoy C at latitude 48°40'34"N., longitude 122°42'44"W.

(d) When Abeam of Matia Island-Buoy CA at latitude 48°45'19"N., longitude 122°46'26"W.

(e) When West of West Point Light-Buoy SH at latitude 47°39'42"N., longitude 122°27'48"W.

(f) When Abeam of Robinson Point-Buoy TB at latitude 47°23'07"N., longitude 122°21'08"W.

(g) When Abeam of Browns Point-Buoy TC at latitude 47°19'30"N., longitude 122°27'19"W.

(h) The boundary of the TSS.

Appendix A-Puget Sound Interim Navigation Rule

(a) No person may operate or cause or authorize the operation of any oil tanker in excess of 125,000 deadweight tons bound for a port or place in the United States in waters of the United States lying east of a straight line extending from Discovery Island Light to New Dungeness Light and to all points in the Puget Sound area north and south of these lights.

(b) Nothing herein affects the exercise by the Commandant of the Coast Guard, the Coast Guard Thirteenth District Commander, the Coast Guard Captain of the Port, Seattle, or the Commanding Officer of the Puget Sound Vessel Traffic Service, in respect to oil tankers of less than 125,000 deadweight tons on Puget Sound, of the authority which has been delegated to them under the Ports and Waterways Safety Act of 1972.

(c) This rule is effective immediately and shall remain in effect until cancelled. Notice of cancellation will be published in the Federal Register.

Part 162.-Inland Waterways Navigation Regulations

§162.195 Santa Monica Bay, Calif.; restricted area. (a) The area. The waters of the Pacific Ocean, Santa Monica Bay, in an area extending seaward from the shoreline a distance of about 5 nautical miles (normal to the shoreline) and basically outlined as follows:

Station
A-33°54'59"N., 118°25'41"W.
B-33°54'59"N., 118°28'00"W.
C-33°53'59.5"N., 118°31'37"W.
D-33°56'19.5"N., 118°34'05"W.
E-33°56'25"N., 118°26'29"W.

(b) The regulations. (1) Vessels shall not anchor within the area at any time without permission.

(2) Dredging, dragging, seining, or other fishing operations which might foul underwater installations within the area are prohibited.

(3) All vessels entering the area, other than vessels operated by or for the United States, the State of California, the county of Los Angeles, or the city of Los Angeles, shall proceed across the area by the most direct route and without unnecessary delay. The area will be open and unrestricted to small recreational craft for recreational activities at all times.

(4) The placing of buoys, markers, or other devices requiring anchors will not be permitted.

(5) The city of Los Angeles will maintain a patrol of the area as needed.

§162.200 Marina del Rey, Calif.; restricted area. (a) The area. That portion of the Pacific Ocean lying shoreward of the offshore breakwater and the most seaward 1,000 feet of the entrance channel between the north and south jetties, and basically outlined as follows:

Station
A-33°57'46.0"N., 118°27'39.5"W.
B-33°57'52.3"N., 118°27'43.6"W.
C-33°57'48.6"N., 118°27'48.8"W.
D-33°57'29.8"N., 118°27'34.7"W.
E-33°57'30.9"N., 118°27'29.1"W.
F-33°57'37.4"N., 118°27'33.8"W.
G-33°57'42.4"N., 118°27'23.0"W.
H-33°57'50.6"N., 118°27'28.3"W.

(b) The regulations. (1) Vessels shall not anchor within the area at any time without permission except in an emergency.

(2) Dredging, dragging, seining, or other fishing operations which might foul underwater installations within the area are prohibited.

NOTE.-The Corps of Engineers also has regulations dealing with this section in 33 CFR 207.

§162.205 San Pablo Bay, Carquinez Strait, Suisun Bay, San Joaquin River, and connecting waters, Calif. (a) Pinole Shoal Channel, San Pablo Bay; use, administration, and navigation. (1) The use of Pinole Shoal Channel is reserved for navigation of vessels of greater draft than 20 feet or by towboats with tows drawing more than 20 feet. Vessels operated by either sail or power and tows drawing less than 20 feet are not permitted to use this channel or to cross it at any point between San Pablo Bay Lighted Buoy 5 and San Pablo Bay Lighted Bell Buoy 13.

(2) Vessels permitted to use Pinole Shoal Channel under paragraph (a) (1) of this section shall proceed through the channel at a reasonable speed so as not to endanger other vessels or interfere with any work which may become necessary in maintaining, surveying, or buoying the channel, and they shall not anchor in the channel, except in cases of emergency such as fog or accident which would render progress unsafe or impossible.

(3) This paragraph shall not be construed as prohibiting any necessary use of the channel by any Government boats while on Government duty, or in emergencies by pilot boats, whether steam or sail, or by police boats, or by the vessels of passenger steamship lines operated on regular schedules.

(b) San Joaquin River Deep Water Channel between Suisun Bay and the easterly end of the channel at Stockton; use, administration, and navigation-(1) Maximum speed. The maximum speed for all ocean-going craft shall not exceed 10 miles per hour above the lower end of New York Slough, seven miles per hour above Criminal Point, or five miles per hour while passing any wharf, dock, or moored craft. As used in this paragraph, the speed of a vessel when navigating with the current shall be its rate of movement in excess of the velocity of the current.

(2) Passing. All craft passing other boats, barges, scows, etc., in motion, moored or anchored, shall slow down and take every necessary precaution to avoid damage.

(3) Right of way. (i) United States dredges, tugs, launches, derrick boats, and similar plant of contractors executing river and harbor improvement work for the United States, and displaying the signals prescribed by the regulations contained in 33 CFR 80, shall have the right of way and other craft shall exercise special caution to avoid interference with the work on which the plant is engaged. Dredges, whether Federal or contractors' plant, working the channel must, however, take special care to give ocean-going vessels sufficient room for passing, and must lift both spuds and the ladder, and pull clear, if an adequate width of clear channelway cannot otherwise be provided. Ocean-going vessels may show at the masthead a black ball not more than 20 inches in diameter as a signal to the dredge, and may also blow five long blasts of the whistle when within reasonable hearing distance of the dredge, such signal to be followed at the proper time by the passing signal described in the local pilot rules. The dredge shall promptly acknowledge both signals in the usual manner.

(ii) Light-draft vessels when meeting or being overtaken by ocean-going vessels, shall give the right of way to such vessels by making use of the shallower portions of the waterway.

(iii) Rafts and tows must promptly give the channel side demanded upon proper signal by a vessel, and must be handled in such a manner as not to obstruct or interfere with the free use of the waterway by other craft.

(4) Collisions. (i) Ocean-going vessels in collision in the channel or turning basin must, if still afloat and in a condition making anchorage necessary, be immediately removed to an approved anchorage ground, or if in such condition that beaching is necessary, they shall be temporarily beached on the northwest side of Mandeville Island or in the Old River.

(ii) Light-draft vessels suffering collision shall be disposed of as directed by the District Commander or his authorized representative.

(5) Wrecks. In no case following accidents of fire or collision will a vessel be allowed to remain either anchored or grounded in the channel, or beached at any place where it endangers other vessels, while settlement is pending with the underwriters.

(6) Other laws and regulations. In all other respects, the existing Federal laws and rules and regulations affecting navigable waters of the United States will govern in this channel.

(c) Sacramento Deep Water Ship Channel between Suisun Bay and easterly end of Turning Basin at West Sacramento; use, administration, and navigation–(1) Maximum speed for all ocean-going craft–(i) Between Tolands Landing (Mile 6.2) and Rio Vista Bridge. When going against a current of two knots or more, the maximum speed over the bottom shall not exceed 8 knots. When going with the current, in slack water, or against a current of two knots or less, the maximum speed through the water shall not exceed 10 knots.

(ii) Between Rio Vista Bridge and Port of Sacramento. When going against a current of two knots or more, the maximum speed over the bottom shall not exceed 5 knots. When going with the current, in slack water, or against a current of two knots or less, the maximum speed through the water shall not exceed 7 knots.

(iii) Speed past docks or moored craft. Within 550 feet of the centerline of the channel the speed shall be the minimum required to maintain steerageway; wind, tide, current, etc., being taken into consideration.

(iv) Passing. All craft passing other boats, barges, scows, etc., underway, moored or anchored, shall take every necessary precaution to avoid damage.

(v) Speed, high-water precautions. When passing another vessel (underway, anchored, or tied up); a wharf or other structure; work under construction; plant engaged in river and harbor improvement; levees withstanding flood waters; buildings partially or wholly submerged by high water; or any other structure liable to damage by collision, suction or wave action; vessels shall give as much leeway as circumstances permit and reduce their speed sufficiently to preclude causing damage to the vessel or structure being passed. As deemed necessary for public safety during high river stages, floods, or other emergencies, the District Commander may prescribe, by navigation bulletins or other means, the limiting speed in knots or temporarily close the waterway or any reach of it to traffic. Since this subparagraph pertains directly to the manner in which vessels are operated, masters of vessels shall be held responsible for strict observance and full compliance herewith.

(2) Right of way. (i) Dredges, tugs, launches, derrick boats and other similar equipment, executing river and harbor improvement work for the United States, and displaying the signals prescribed by the regulations contained in 33 CFR 80, shall have the right-of-way and other craft shall exercise special caution to avoid interference with the work on which the plant is engaged. Dredges, whether Federal or contractor's plant, working the channel must however, take special care to give ocean-going vessels sufficient room for passing, and must lift both spuds and the ladder, and pull clear, if an adequate width of clear channelway cannot otherwise be provided.

(ii) Vessels intending to pass dredges or other types of floating plant working in navigable channels, when within a reasonable distance therefrom and not in any case over a mile, shall indicate such intention by one long blast of the whistle, and shall be directed to the proper side for passage by the sounding, by the dredge or other floating plant, of the signal prescribed in the inland pilot rules for vessels underway and approaching each other from opposite directions, which shall be answered in the usual manner by the approaching vessel. If the channel is not clear, the floating plant shall sound the alarm or danger signal and the approaching vessel shall slow down or stop and await further signal from the plant.

(iii) When the pipeline from a dredge crosses the channel in such a way that an approaching vessel cannot pass safely around the pipeline or dredge, there shall be sounded immediately from the dredge the alarm or danger signal and the approaching vessel shall slow down or stop and await further signal from the dredge. The pipeline shall then be opened and the channel cleared as soon as practicable; when the channel is clear for passage the dredge shall so indicate by sounding the usual passing signal as prescribed in paragraph (c)(2)(ii) of this section. The approaching vessel shall answer with a corresponding signal and pass promptly.

(iv) When any pipeline or swinging dredge shall have given an approaching vessel or tow the signal that the channel is clear, the dredge shall straighten out within the cut for the passage of the vessel or tow.

(v) Shallow draft vessels when meeting or being overtaken by ocean-going vessels, shall give the right-of-way to such vessels by making use of the shallower portions of the waterway, wherever possible.

(vi) Tows should promptly give the channel side requested by proper signal from a vessel, and should be handled in such a manner as not to obstruct or interfere with the free use of the waterway by other craft.

(3) Obstruction of traffic. (i) Except as provided in paragraph (c)(2) of this section no person shall willfully or carelessly obstruct the free navigation of the waterway, or delay any vessel having the right to use the waterway.

(ii) No vessel shall anchor within the channel except in distress or under stress of weather. Any vessel so anchored shall be moved as quickly as possible to such anchorage as will leave the channel clear for the passage of vessels.

(iii) Motorboats, sailboats, rowboats, and other small craft shall not anchor or drift in the regular ship channel except under stress of weather or in case of breakdown. Such craft shall be so operated that they will not interfere with or endanger the movement of commercial or public vessels.

(4) Collisions. (i) Ocean-going vessels in collision in the channel or turning basin, must if still afloat and in a condition making anchorage necessary, be immediately removed to an approved anchorage ground, or if in such condition that beaching is necessary, they shall be temporarily beached on the southwest side of Ryer Island from Mile 15.0 to Mile 16.3 or in the Harbor and Turning Basin at West Sacramento.

(ii) Light-draft vessels suffering collision shall be disposed of as directed by the District Commander or his authorized representative.

(5) Marine accidents. Masters, mates, pilots, owners, or other persons using the waterway to which this paragraph applies shall notify the Commander, 12th U.S. Coast Guard District and in the case of undocumented vessels, the State Division of Small Craft Harbors also, by the most expeditious means available of all marine accidents, such as fire, collision, sinking or stranding, where there is possible obstruction of the channel or interference with navigation or where damage to Government property is involved, furnishing a clear statement as to the name, address, and ownership of the vessel or vessels involved, the time and place, and the action taken. In all cases, the owner of the sunken vessel shall take immediate steps to mark the wreck properly.

(6) Other laws and regulations. In all other respects, existing Federal laws and rules and regulations affecting navigable waters of the United States will govern in this channel.

NOTE.–The Corps of Engineers also has regulations dealing with this section in 33 CFR 207.

§162.210 Lake Tahoe, Calif.; restricted areas along south shore. (a) The areas-(1) Baldwin Beach, under the control of the Forest Service, Department of Agriculture. The waters of Lake Tahoe shoreward of a line described as follows: Beginning at the intersection of the high waterline with the west boundary line of Lot 2, Section 26, Township 13 North (Mount Diablo Base Line), Range 17 East (Mount Diablo Meridian); thence north 300 feet; thence southeasterly about 2,850 feet to the east line of Section 26 at a point 300 feet north of the high waterline; thence northeasterly 1,740 feet to a point 300 feet north of the high waterline; thence southeasterly about 1,810 feet to the projected east line of the former Baldwin property at a point 300 feet north of the high waterline; and thence south 300 feet to the high waterline.

(2) Camp Richardson, under the control of the Forest Service, Department of Agriculture. The waters of Lake Tahoe shoreward of a line described as follows: Beginning at the southeasterly corner of sec. 25, T. 13 N., R. 17 E., Mount Diablo Base and Meridan; thence north 410 feet along the east line of sec. 25; thence northwesterly 95 feet to the high waterline which is the true point of beginning; thence north 130 feet; thence southeasterly 565 feet; and thence south 130 feet to the high waterline.

(3) Pope Beach, under the control of the Forest Service, Department of Agriculture. The waters of Lake Tahoe shoreward of a line described as follows: Beginning at the intersection of the high waterline with the west line of the former Pope property, about 750 feet westerly of the west boundary line of Lot 2, Section 6, Township 12 North (Mount Diablo Base Line), Range 18 East (Mount Diablo Meridian); thence north 300 feet; thence southeasterly 4,200 feet to a point 300 feet north of the high waterline; and thence south 300 feet to the high waterline.

(4) El Dorado County Beach. The waters of Lake Tahoe shoreward of a line described as follows: Beginning at the intersection of the high waterline with the west boundary line of Lot 1, Section 32, Township 13 North (Mount Diablo Base Line), Range 18 East (Mount Diablo Meridian); thence north 500 feet; thence northeasterly about 1,350 feet to the projected east line of Lot 1 at a point 500 feet north of the high waterline; and thence south 500 feet to the high waterline.

(b) The regulations. No sail or machine-propelled watercraft, except vessels owned or controlled by the U.S. Coast Guard, shall navigate or anchor in the restricted area.

§162.215 Lake Tahoe, Nev.; restricted area adjacent to Nevada Beach. (a) The restricted area. The waters of Lake Tahoe shoreward of a line described as follows: Beginning at the intersection of the high waterline with a line projected in a general southerly direction 200 feet from a point lying 310 feet west of section corner common to section 15, 16, 21, and 22, Township 13 North (Mt. Diablo Base Line), Range 18 East (Mt. Diablo Meridian); thence 300 feet lakeward at right angles to the high waterline; thence southeasterly approximately 2,170 feet to the projected south boundary line of the Forest Service property at a point 300 feet west of the high waterline; and thence east 300 feet to the high waterline.

(b) The regulations. No sail or motor propelled water craft, except vessels owned or controlled by the United States Government and vessels duly authorized by the United States Coast Guard shall navigate or anchor in the restricted area.

§162.220 Hoover Dam, Lake Mead, and Lake Mohave (Colorado River), Ariz.-Nev. (a) Lake Mead and Lake Mohave; restricted areas-(1) The areas. That portion of Lake Mead extending 700 feet upstream of the axis of Hoover Dam and that portion of Lake Mohave (Colorado River) extending 4,500 feet downstream of the axis of Hoover Dam.

(2) The regulations. The restricted areas shall be closed to navigation and other use by the general public. Only vessels owned by or controlled by the U.S. Government and the States of Arizona and Nevada shall navigate or anchor in the restricted areas: Provided, however, The Regional Director, Region 3, U.S. Bureau of Reclamation, Boulder City, Nev., may authorize, by written permit, individuals or groups to navigate or anchor in the restricted areas when it is deemed in the public interest. Copies of said permits shall be furnished the enforcing agencies.

(b) Lake Mead; speed regulation. In that portion of Lake Mead extending 300 feet upstream of the restricted area described in paragraph (a) of this section, a maximum speed of 5 miles per hour shall not be exceeded.

(c) Supervision. The regulations in this section shall be supervised by the District Commander, Eleventh Coast Guard District.

§162.225 Columbia and Willamette Rivers, Washington and Oregon; administration and navigation. (a) Supervision. The District Commander, Thirteenth Coast Guard District, has certain administrative supervision over the Columbia and Willamette Rivers, and is charged with the enforcement under his direction of emergency regulations to govern navigation of these streams.

(b) Speed. During very high water stages (usually 25 feet or more on the Vancouver, Washington, gage) when lives, floating plant or major shore installations are endangered, the District Commander shall have authority to prescribe such temporary speed regulations as he may deem necessary for the public safety. During critical periods of freshets under 25 feet on the Vancouver, Washington, gage when construction is in progress, rehabilitation, or other unusual emergency makes a major shore installation susceptible to loss or major damage from wave action, the District Commander shall have authority to prescribe for a particular limited reach of the river as appropriate such temporary speed regulations as he may deem necessary to protect the integrity of such structure. All speed regulations prescribed by the District Commander shall be obeyed for the duration of the emergency and shall be terminated at the earliest practicable time that improved stream conditions permit.

§162.230 Columbia River, Wash. (a) Grand Coulee Dam discharge channel; restricted area-(1) The area. That portion of the Columbia River between Grand Coulee Dam (situated at river mile 596.6) and river mile 593.7.

(2) The regulations. (i) No vessel shall enter or navigate within the area without permission from the enforcing agency.

(ii) The regulation in this section shall be enforced by the Chief, Power Field Division, Columbia Basin Project, U.S. Department of the Interior, Coulee Dam, Washington.

§162.235 Puget Sound Area, Wash. (a) Waterway connecting Port Townsend and Oak Bay; use, administration, and navigation-(1) Works to which regulations apply. The "canal grounds" when used in this paragraph shall mean that area between the south end of the jetties in Oak Bay and the northerly end of the dredge channel approximately 400 yards northwest of Port Townsend Canal Light. The "canal" is the water lying between these limits and the banks containing the same.

(2) Speed. The speed limit within the canal grounds shall not exceed five miles per hour.

(3) Signals. All boats desiring to use the canal shall give one long and one short whistle. Southbound boats shall sound the signal within 600 yards of Port Townsend Canal Light. Northbound boats shall sound this signal at least 500 feet south from the end of the jetties in Oak Bay. If no other boat answers the signal the first boat shall have the right of way through the canal. Any approaching boat that is in the canal shall answer by giving the same signal and the first boat shall not enter the canal until the second boat shall have passed through the canal. In the case of boats going in the same direction the boat which is in the canal shall not answer the signal of the boat desiring to enter.

(4) Passing. Steamers shall not under any circumstances attempt to pass each other in the canal, either when going in the same or opposite directions.

(5) Anchoring. No steamers or boats shall anchor or tie up within the canal grounds unless they are well over on the tide flats to the west of the dredged channel, and off the right of way belonging to the United States.

(6) Tows. No tow shall enter or pass through the canal with a towline more than 200 feet in length.

(7) Delaying traffic. No person shall cause or permit any vessel or boat of which he is in charge, or on which he is employed, to obstruct the canal in any way or delay in passing through it.

(b) West Waterway, Seattle Harbor; navigation. (1) The movement of vessels of 250 gross tons or over and all vessels with tows of any kind through the narrow section of West Waterway between the bend at Fisher's Flour Mill dock and the bend at the junction of East Waterway with Duwamish Waterway, and through the draws of the City of Seattle and Northern Pacific Railway Company bridges crossing this narrow section, shall be governed by red and green traffic signal lights mounted on the north and south sides of the west tower of the City Light power crossing at West Spokane Street.

(2) Two green lights, one vertically above the other, displayed ahead of a vessel, shall indicate that the waterway is clear. Two red lights, one vertically above the other, displayed ahead of a vessel, shall indicate that the waterway is not clear.

(3) A vessel approaching the narrow section and drawbridges from either end of the waterway shall give one long blast of a whistle and shall not enter the narrow section until green lights are displayed.

(4) One vessel may follow another vessel in either direction, but the channel shall not be kept open in the same direction for an unreasonable time if a vessel is waiting at the other end.

(5) Tugs, launches, and small craft shall keep close to one side of the channel when vessels or boats with tows are passing.

(6) All craft shall proceed with caution. The display of a green light is not a guarantee that the channel is clear of traffic, and neither the United States nor the City of Seattle will be responsible for any damage to vessels or other property which may be chargeable to mistakes in the operation of the signal lights or to their failure to operate.

NOTE.–The Corps of Engineers also has regulations dealing with this section in 33 CFR 207.

§162.270 Restricted areas in vicinity of Maritime Administration Reserve Fleets. (a) The regulations in this section shall govern the use and navigation of waters in the vicinity of the following National Defense Reserve Fleets of the Maritime Administration, Department of Commerce.

(1) (Reserved)

(2) James River Reserve Fleet, Fort Eustis, Virginia.

(3) (Reserved)

(4) Mobile Reserve Fleet, Tensaw River near Bay Minette, Alabama.

(5) Beaumont Reserve Fleet, Neches River near Beaumont, Texas.

(6) Suisun Bay Reserve Fleet near Benicia, California.

(7) (Reserved)

(8) Olympia Reserve Fleet, Budd Inlet at Olympia, Washington.

(b) No vessels or other watercraft, except those owned or controlled by the United States Government, shall cruise or anchor between Reserve Fleet units within 500 feet of the end vessels in each Reserve Fleet unit, or within 500 feet of the extreme units of the fleets, unless specific permission to do so has first been granted in each case by the enforcing agency.

(c) The regulations in this section shall be enforced by the respective Fleet Superintendents and such agencies as they may designate.

Part 164–Navigation Safety Regulations (in part). For a complete description of this part see 33 CFR 164.

§164.01 Applicability.

(a) This part (except for §164.38 and §164.39) applies to each self-propelled vessel of 1600 or more gross tons (except foreign vessels described in §164.02) when it is operating in the navigable waters of the United States except the St. Lawrence Seaway.

§164.02 Applicability exception for foreign vessels. (See 33 CFR 164.)

§164.11 Navigation underway: General.

The owner, master, or person in charge of each vessel underway shall ensure that:

(a) The wheelhouse is constantly manned by persons who–

(1) Direct and control the movement of the vessel; and

(2) Fix the vessel's position;

(b) Each person performing a duty described in paragraph (a) of this section is competent to perform that duty;

(c) The position of the vessel at each fix is plotted on a chart of the area and the person directing the movement of the vessel is informed of the vessel's position;

(d) Electronic and other navigational equipment, external fixed aids to navigation, geographic reference points, and hydrographic contours are used when fixing the vessel's position;

(e) Buoys alone are not used to fix the vessel's position;

Note: Buoys are aids to navigation placed in approximate positions to alert the mariner to hazards to navigation or to indicate the orientation of a channel. Buoys may not maintain an exact position because strong or varying currents, heavy seas, ice, and collisions with vessels can move or sink them or set them adrift. Although buoys may corroborate a position fixed by other means, buoys cannot be used to fix a position: however, if no other aids are available, buoys alone may be used to establish an estimated position.

(f) The danger of each closing visual or each closing radar contact is evaluated and the person directing the movement of the vessel knows the evaluation;

(g) Rudder orders are executed as given;

(h) Engine speed and direction orders are executed as given;

(i) Magnetic variation and deviation and gyrocompass errors are known and correctly applied by the person directing the movement of the vessel;

(j) A person whom he has determined is competent to steer the vessel is in the wheelhouse at all times (See also 46 U.S.C. 672, which requires an able seaman at the wheel on U.S. vessels of 100 gross tons or more in narrow or crowded waters or during low visibility.);

(k) If a pilot other than a member of the vessel's crew is employed, the pilot is informed of the draft, maneuvering characteristics, and peculiarities of the vessel and of any abnormal circumstances on the vessel that may affect its safe navigation.

(l) Current velocity and direction for the area to be transited are known by the person directing the movement of the vessel;

(m) Predicted set and drift are known by the person directing movement of the vessel;

(n) Tidal state for the area to be transited is known by the person directing movement of the vessel;

(o) The vessel's anchors are ready for letting go;

(p) The person directing the movement of the vessel sets the vessel's speed with consideration for–

(1) The prevailing visibility and weather conditions;

(2) The proximity of the vessel to fixed shore and marine structures;

(3) The tendency of the vessel underway to squat and suffer impairment of maneuverability when there is small underkeel clearance;

(4) The comparative proportions of the vessel and the channel;

(5) The density of marine traffic;

(6) The damage that might be caused by the vessel's wake;

(7) The strength and direction of the current; and

(8) Any local vessel speed limit;

(q) The tests required by §164.25 are made and recorded in the vessel's log; and

(r) The equipment required by this part is maintained in operable condition.

§164.15 Navigation underway: Confined or congested waters.

In the confined or congested waters described in §164.16, the master or person in charge of each vessel underway shall ensure that–

(a) Propulsion machinery can respond immediately through its full operating range;

(b) The engine room, including the main engine control station even if it is not in the engine room, is manned to operate the propulsion machinery as required by paragraph (a) of this section;

(c) Persons are available to rapidly anchor the vessel in an emergency; and

(d) The automatic pilot device is not in use.

§164.16 List of confined or congested waters. (Reserved)

§164.19 Requirements for vessels at anchor.

The master or person in charge of each vessel that is anchored shall ensure that–

(a) A proper anchor watch is maintained;

(b) Procedures are followed to detect a dragging anchor; and

(c) Whenever weather, tide, or current conditions are likely to cause the vessel's anchor to drag, action is taken to ensure the safety of the vessel, structures, and other vessels, such as being ready to veer chain, let go a second anchor, or get underway using the vessel's own propulsion or tug assistance.

§164.25 Tests before entering or getting underway.

(a) Except as provided in paragraphs (b) and (c) of this section no person may cause a vessel to enter into or get underway on the navigable waters of the United States unless no more than 12 hours before entering or getting underway, the following equipment has been tested:

(1) Primary and secondary steering gear.

(2) All internal vessel control communications and vessel control alarms.

(3) Standby or emergency generator, for as long as necessary to show proper functioning, including steady state temperature and pressure readings.

(4) Storage batteries for emergency lighting and power systems in vessel control and propulsion machinery spaces.

(5) Main propulsion machinery, ahead and astern.

(b) Vessels navigating on the Great Lakes and their connecting and tributary waters, having once completed the test requirements of this sub-part, are considered to remain in compliance until arriving at the next port of call on the Great Lakes.

(c) Vessels entering the Great Lakes from the St. Lawrence Seaway are considered to be in compliance with this sub-part if the required tests are conducted preparatory to or during the passage of the St. Lawrence Seaway or within one hour of passing Wolfe Island.

§164.30 Charts, publications, and equipment: General.

No person may operate or cause the operation of a vessel unless the vessel has the charts, publications, and equipment as required by §§164.33 through 164.41 of this part.

§164.33 Charts and publications.

(a) Each vessel must have the following:

(1) Except as provided by paragraph (b) of this section, charts of the area to be transited published by the National Ocean Survey, U.S. Army Corps of Engineers, or a river authority that–

(i) Are of a large enough scale and have enough detail to enable safe navigation of the area; and

(ii) Are the most recently published and available for the area and currently corrected.

(2) Except as provided by paragraph (b) of this section, the most recent, available, and currently corrected copy of, or applicable extract from, each of the following publications, if it includes the area to be transited:

(i) U.S. Coast Pilot.

(ii) Coast Guard Light List.

(iii) Notices to Mariners published by Defense Mapping Agency Hydrographic/Topographic Center and local Coast Guard Notice to Mariners.

(iv) Tide Tables published by the National Ocean Survey.

(v) Tidal Current Tables published by the National Ocean Survey, or river current publication issued by the U.S. Army, Corps of Engineers, or a river authority.

(b) A vessel may have a chart or publication published by a foreign government instead of a chart or publication required by this section if the chart or publication contains similar information to the U.S. Government publication or chart. A vessel bound from a foreign port to a port in the United States may have the latest charts and publications that were available at previous ports of call.

§164.35 Equipment: All vessels.

Each vessel must have the following:

(a) A marine radar system for surface navigation.

(b) An illuminated magnetic steering compass, mounted in a binnacle, that can be read at the vessel's main steering stand.

(c) A current magnetic compass deviation table or graph or compass comparison record for the steering compass, in the wheelhouse.

(d) A gyrocompass.

(e) An illuminated repeater for the gyrocompass required by paragraph (d) of this section that is at the main steering stand, unless that gyrocompass is illuminated and is at the main steering stand.

(f) An illuminated rudder angle indicator in the wheelhouse.

(g) The following maneuvering information prominently displayed on a fact sheet in the wheelhouse:

(1) For full and half speed, a turning circle diagram to port and starboard that shows the time and the distance of advance and transfer required to alter the course 90 degrees with maximum rudder angle and constant power settings.

(2) The time and distance to stop the vessel from full and half speed while maintaining approximately the initial heading with minimum application of rudder.

(3) For each vessel with a fixed propeller, a table of shaft revolutions per minute for a representative range of speeds.

(4) For each vessel with a controllable pitch propeller, a table of control settings for a representative range of speeds.

(5) For each vessel that is fitted with an auxiliary device to assist in maneuvering, such as a bow thruster, a table of vessel speeds at which the auxiliary device is effective in maneuvering the vessel.

(6) The maneuvering information for the normal load and normal ballast condition for–

(i) Calm weather-wind 10 knots or less, calm sea;

(ii) No current;

(iii) Deep water conditions-water depth twice the vessel's draft or greater; and

(iv) Clean hull.

(7) At the bottom of the fact sheet, the following statement:

Warning.

The response of the (name of the vessel) may be different from that listed above if any of the following conditions, upon which the maneuvering information is based, are varied:

(1) Calm weather-wind 10 knots or less, calm sea;

(2) No current;

(3) Water depth twice the vessel's draft or greater;

(4) Clean hull; and

(5) Intermediate drafts or unusual trim.

(h) An echo depth sounding device.

(i) A device that can continuously record the depth readings of the vessel's echo depth sounding device, except when operating on the Great Lakes and their connecting and tributary waters.

(j) Equipment on the bridge for plotting relative motion.

§164.37 Equipment: Vessels of 10,000 gross tons or more.

(a) Each vessel of 10,000 gross tons or more must have, in addition to the radar system under §164.35(a), a second marine radar system that operates independently of the first.

Note.–Independent operation means two completely separate systems, from separate branch power supply circuits or distribution panels to antennas, so that failure of any component of one system will not render the other system inoperative.

(b) On each tanker of 10,000 gross tons or more that is subject to Section 5 of the Port and Tanker Safety Act of 1978 (46 U.S.C. 391a), the dual radar system required by this part must have a short range capability and a long range capability and each radar must have true north features consisting of a display that is stabilized in azimuth.

§164.38 Automatic radar plotting aids (ARPA). (See 33 CFR 164.)

§164.39 Steering gear: Tank vessels. (See 33 CFR 164.)

§164.41 Electronic Position Fixing Devices.

(a) This section applies to vessels calling at ports in the continental U.S. including Alaska south of Cape Prince of Wales, except those vessels owned or bareboat chartered and operated by the United States, by a state or its political subdivision, or by a foreign nation, and not engaged in commerce.

(b) Each vessel must have one of the following devices installed:

(1) A Loran-C receiver meeting paragraph (c) of this section.

(2) A continual update, satellite-based hybrid navigation receiver meeting paragraph (d) of this section.

(3) A system that is found by the Commandant to meet the intent of the statements of availability, coverage, and accuracy for the U.S. Coastal Confluence Zone (CCZ) contained in the U.S. "Department of Transportation (DOT) National Plan for Navigation" (Report No. DOT-TST-78-4, dated November 1977). A person desiring a finding by the Commandant under this subparagraph must submit a written request describing the device to: Commandant (G-WLE/73), U.S. Coast Guard, Washington, D.C. 20950. After reviewing the request, the Commandant may require additional information to establish whether or not the device meets the intent of the "DOT National Plan for Navigation."

Note.–The "DOT National Plan for Navigation" is available from the National Technical Information Service, Springfield, Va. 22161. Government Accession No. AD-A-052269.

(c) Each Loran-C receiver installed after May 31, 1979, must meet the following:

(1) Be a Type I or II receiver as defined in Section 1.2(e), meeting Part 2 (Minimum Performance Standards) of the Radio Technical Commission for Marine Services (RTCM) Paper 12-78/DO-100 dated December 20, 1977, and entitled "Minimum Performance Standards (MPS) Marine Loran-C Receiving Equipment." The standards referred to in this subparagraph are intended to be incorporated by reference as they exist on December 20, 1977, and notice of any change in these standards will be published in the **Federal Register.** This incorporation by reference was approved by the Director of the Federal Register on May 25, 1979, and is available for inspection at the Office of the Federal Register Library, Room 8401, 1100 L St. NW. Washington, D.C. 20408. The RTMC paper is available from the Radio Technical Commission for Marine Services, P.O. Box 19087, Washington, D.C. 20036 ((202) 296-6610).

(2) After June 1, 1982, except as allowed by paragraph (c)(3) of this section, have a permanently affixed label containing–

(i) The name and address of the manufacturer; and

(ii) The following statement:

This receiver was designed and manufactured to comply with Part 2 (Minimum Performance Standards) of the RTCM MPS for Marine Loran-C Receiving Equipment.

(3) Each Loran-C receiver installed before June 1, 1982, that meets paragraph (c)(1) of this section must meet paragraph (c)(2) of this section on June 1, 1985.

(d) Each hybrid satellite system must have–

(1) Automatic acquisition of satellite signals after initial operator settings have been entered;

(2) Position updates derived from satellite information obtained during each usable satellite pass; and

(3) A continual tracking integrated complementary system that provides automatically, in between satellite passes, position updates at intervals of one minute or less.

(e) Each satellite navigation receiver installed before June 1, 1982, that meets paragraphs (d)(1) and (2), of this section must meet paragraph (d)(3) of this section on June 1, 1985.

§164.51 Deviations from rules: Emergency.

Except for the requirements of §164.53(b), in an emergency, any person may deviate from any rule in this part to the extent necessary to avoid endangering persons, property, or the environment.

§164.53 Deviations from rules and reporting: Nonoperating equipment.

(a) If during a voyage any equipment required by this part stops operating properly, the person directing the movement of the vessel may complete the voyage subject to the requirements in 33 CFR 160.

(b) If the vessel's radar, radio navigation receivers, gyrocompass, echo depth sounding device, or primary steering gear stops operating properly, the person directing the movement of the vessel must report or cause to be reported that it is not operating properly to the nearest Captain of the Port, District Commander, or, if participating in a Vessel Traffic Service, to the Vessel Traffic Center, as soon as possible.

§164.55 Deviations from rules: Continuing operation or period of time.

The Captain of the Port, upon written application, may authorize a deviation from any rule in this part if he determines that the deviation does not impair the safe navigation of the vessel under anticipated conditions and will not result in a violation of the rules for preventing collisions at sea. The authorization may be issued for vessels operating in the waters under the jurisdiction of the Captain of the Port for any continuing operation or period of time the Captain of the Port specifies.

§164.61 Marine casualty reporting and record retention.

When a vessel is involved in a marine casualty as defined in 46 CFR 4.03-1, the master or person in charge of the vessel shall–

(a) Ensure compliance with 46 CFR 4.05, "Notice of Marine Casualty and Voyage Records," and

(b) Ensure that the voyage records required by 46 CFR 4.05-15 are retained for–

(1) 30 days after the casualty if the vessel remains in the navigable waters of the United States; or

(2) 30 days after the return of the vessel to a United States port if the vessel departs the navigable waters of the United States within 30 days after the marine casualty.

Part 165–Safety Zones

Subpart A–General

§165.01 Purpose.

The purpose of this part is to set forth the procedures for the establishment of safety zones for protection of vessels, structures, and water and shore areas, to set forth regulations applicable to the zones, and to publish specific safety zones when they have continuing application.

§165.05 Definitions.

For the purpose of this part: "Safety zone" means a designated water area, shore and water area, or shore area to which, for safety or environmental purposes, access is limited to persons, vehicles, vessels, or objects authorized by the Captain of the Port. It may be stationary and described by fixed limits or it may be described as a zone around a vessel in motion.

"Vehicle" means every type of conveyance capable of being used as a means of transportation on land.

§165.10 Delegation.

The Commandant delegates to the Captain of the Port and the District Commander authority to establish safety zones. The establishment of a safety zone may be based on a request under the procedures in 165.15 or may be undertaken on the initiative of the Captain of the Port or the District Commander.

§165.15 Application procedures.

(a) Any person may request that the Captain of the Port or the District Commander establish a safety zone. Except as provided in paragraph (b) of this section, the request must be in writing. Each request must include the following:

(1) The name of the person submitting the request.

(2) The location and boundaries of the safety zone.

(3) The date, time, and duration of the safety zone.

(4) Description of activities within the safety zone.

(5) The reason for the request.

(b) If for good cause the request for the safety zone is made less than 5 working days before the zone is requested to be established, the request may be made orally, but it must be followed by a written request within 24 hours after the oral request.

Note: The procedures used by the Captain of the Port to notify persons of the establishment of a safety zone vary depending on circumstances and emergency conditions.

Notification of the establishment of a safety zone may be by marine broadcasts, local notice to mariners, local news media, distribution in leaflet form, on-scene oral notice or publication in the FEDERAL REGISTER. Notification normally contains the physical boundaries of the zone, the reasons for the safety zone, estimated duration of the zone, and the method of obtaining authorization to enter the safety zone.

Notification of the termination of a safety zone is usually made in the same form as the notification of the establishment of a zone.

§165.20 General regulations.

Unless otherwise provided in this part, (a) No person may enter a safety zone unless authorized by the Captain of the Port or the District Commander.

(b) No person may bring or cause to be brought into a safety zone any vehicle, vessel, or object unless authorized by the Captain of the Port or the District Commander.

(c) No person may remain in a safety zone or allow any vehicle, vessel, or object to remain in a safety zone unless authorized by the Captain of the Port or the District Commander; and

(d) Each person in a safety zone who has notice of a lawful order or direction shall obey the order or direction of the Captain of the Port, District Commander, or his authorized representative issued to carry out the purposes of this part.

§165.25 Appeals.

(a) Any person directly affected by the establishment of a safety zone or an order or direction issued under this part may request reconsideration of the establishment, order, or direction by the official who established the safety zone or issued the order or direction and may appeal through the Captain of the Port to the District Commander and then to the Commandant, whose decision shall be final.

(b) Request for reconsideration and appeals may be written or oral, but if oral must be followed by no less than a written outline of the key points made. The Coast Guard official to whom the request or appeal is made will provide a written decision if requested.

(c) While any request or appeal is pending, the safety zone, order, or direction remains in effect.

Subpart B–List of Safety Zones

§165.1101 San Diego Bay, Calif. (a) The waters of San Diego Bay enclosed by the following boundaries are a safety zone: A line beginning at latitude 32°43'37.2"N., longitude 117°10'45.0"W.; thence to latitude 32°43'36.2"N., longitude 117°10'41.5"W.; thence to latitude 32°43'27.8"N., longitude 117°10'45.8"W.; thence to latitude 32°43'30.0"N., longitude 117°10'53.0"W.; thence to latitude 32°43'33.0"N., longtitude 117°10'51.5"W.; thence along the boundary of Coast Guard Air Station San Diego, to the point of beginning.

Note.–The northeast, southeast, and southwest corners of the safety zone are marked by white buoys with horizontal orange bands.

§165.1107 Queensway Bay, Long Beach, Calif. (a) The Area enclosed by the following boundary is a Safety Zone-the waters of Queensway Bay enclosed by a line beginning on shore at latitude 33°45'49.6"N., longitude 118°10'36.0"W.; thence southerly to 33°45'33.0"N., longitude 118°10'36.0"W.; thence westerly to the eastmost lighted marker on Island Grissom (latitude 33°45'33.0"N., longitude 118°10'43.5"W.); thence northerly and westerly along the shoreline of Island Grissom to latitude 33°45'36.8"N., longitude 118°10'53.0"W., thence northwesterly to the shoreline to latitude 33°45'44.5"N., longitude 118°11'00.0"W.; thence easterly along the shoreline to the beginning point.

(b) No vessel may enter or remain in the safety zone except (1) Derrick barges, dredges, tugs, workboats or other vessels engaged in the construction of the Long Beach Downtown Marina. (2) Tugs, barges, and other vessels supporting oil operations on Island Grissom. (3) Vessel operated or contracted for by the City of Long Beach. (4) Other vessels specifically authorized by the Captain of the Port.

Note.-The boundary of the safety zone will be clearly delineated by white buoys displaying the orange diamond cross.

§165.1108 San Pedro Bay, Los Angeles, Calif. (a) The area enclosed by the following boundary is a safety zone-the waters of San Pedro Bay enclosed by a line beginning at Fish Harbor Channel Light 4 (latitude 33°43′51.0″N., longitude 118°15′50.0″W.); thence southeasterly to latitude 33°43′43.5″N., longitude 118°15′45.8″W.; thence northeasterly to latitude 33°44′03.6″N., longitude 118°14′36.4″W.; thence northwesterly to latitude 33°44′43.8″N., longitude 118°14′56.0W.; thence southeasterly along the Terminal Island shoreline to the beginning point.

(b) No vessel may enter or remain in the safety zone except: (1) Vessels engaged in the construction of the landfill site for the Los Angeles Harbor dredging project; (2) vessels operated by or under contract to the U.S. Army Corps of Engineers or the City of Los Angeles; and (3) any other vessels specifically authorized to be in the zone by the Captain of the Port Los Angeles-Long Beach.

Note.-The southerly and easterly sides of the safety zone will be clearly marked by white buoys displaying the orange diamond cross daymark.

Part 204–Danger Zone Regulations

§204.195 Anaheim Bay Harbor, Calif.; Naval Weapons Station, Seal Beach. (a) The danger zone. The waters of Anaheim Bay Harbor between the east and west jetties at the United States Naval Weapons Station, Seal Beach California, and the contiguous tidal channel and basin as far east as the Pacific Electric Railway bridge.

(b) The regulations. (1) Passage and transit of Anaheim Bay and Harbor is permitted to regularly documented vessels and power boats having a Certificate of Number assigned by the State of California Division of Small Craft Harbors subject to these regulations and the military operation within the area.

(2) All craft authorized for transit of this area and properly registered in the Security Office with the name and address of owner, description, color, and size of the craft, will be provided a decal for identification at the time of registration. The decal must be displayed on the windshield or such other area to permit security personnel to view the decal.

(3) Decals will not be transferred from one boat to another nor from one person to another, and must be destroyed when no longer desired by the individual originally registering the boat.

(4) Sailing vessels shall use auxiliary power in the inner harbor area.

(5) Rowboats, canoes, kayaks, surfboards, water skis, etc., are specifically prohibited within the danger and controlled zones.

(6) All boats shall proceed through the danger zone by the route prescribed by the enforcing agency.

(7) Speed shall not exceed 8 knots in the outer harbor and 3 knots in the inner harbor. Private boats unable to throttle down or to maintain steerage way at 3-knot speed may proceed at the minimum speed (in excess of 3 knots) consistent with good seamanship and with waterborne explosive handling operations in progress. In case of doubt, boat operators of inbound boats will remain in the west end of the basin and outbound boats in the east end of the basin until informed of the completion of the waterborne explosive handling hazard. (The hazard is usually the hand passing of live ammunition from small boats to lighters moored at the east end of the wharf.)

(8) Smoking in boats is prohibited during the transit of this area.

(9) All craft of whatever category shall have the right at any time to seek shelter in these waters because of stress of weather. Boats entering the area during the hours of darkness, seeking shelter, or seeking transit, shall stop at the dock located near the bridge and clear with the posted sentry.

(10) Nothing in these regulations of this section shall be construed as relieving the owner or persons in command of any vessels or plant from the penalties of the law for obstructing navigation or for not complying with the navigation laws in regard to lights or signals or for otherwise violating law.

(11) All boats shall heed and obey all posted signs and/or instructions issued by security personnel of the U.S. Naval Weapons Station.

(12) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Weapons Station, Seal Beach, Calif., and such agencies as he may designate. For clarification or other information, the U.S. Naval Weapons Station, Officer of the Day, should be contacted.

§204.197 Pacific Ocean in vicinity of San Pedro, Calif.; practice firing range for United States Army Reserve, National Guard, and Coast Guard units. (a) The danger zone. (1) (Reserved.)

(2) Zone B. An area extending southwest and northwest from Point Vicente, described as follows: Beginning at Point Vicente Light, latitude 33°44′30″, longitude 118°24′36″; thence southwesterly to latitude 33°43′42″, longitude 118°25′24″; thence northwesterly to latitude 33°46′30″, longitude 118°27′06″; thence southeasterly to the shore, latitude 33°44′54″, longitude 118°24′42″; and thence southerly along the shore to the point of beginning.

(b) The regulations. (1) Intermittent firing may take place in the danger zone on any day from sunrise to sunset.

(2) Except as otherwise provided in this paragraph, the danger zone will be open to fishing and general navigation. When firing is not scheduled

the danger zone may be occupied without restriction. When firing is in progress safety observers will be maintained to warn all vessels. Notice to vacate the area, or to stop at the boundaries, will be given by siren, patrol vessel, or other effective means, and such notice shall be promptly obeyed. All vessels permitted to enter the danger zone during a firing period, other than those owned by and operated by or under the direction of the United States Government, shall proceed across the area by the most direct route and clear the area with the greatest possible dispatch. No vessel, fishing boat, or recreational craft shall anchor in the danger zone during an actual firing period.

(3) Nothing in this section shall be construed as relieving the owner or person in charge of a vessel from any penalties for obstructing navigation, or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights and fog signals, or for otherwise violating any law or regulations.

(4) The regulations in this section shall be enforced by the Commanding Officer, Fort MacArthur, California, and such agencies as he may designate.

§204.200 Pacific Ocean at San Clemente Island, Calif.; Navy shore bombardment area in vicinity of Pyramid Cove. (a) The danger zone. Shoreward of a line beginning at White Washed Rock on the beach bearing 199° true, 540 yards, from Pyramid Head Light; thence 160°30′ true, 1.17 nautical miles; thence 243°30′ true, 2.35 nautical miles; and thence 307° true to the beach.

(b) The regulations. (1) This area is used for shore bombardment by the United States Navy and all vessels shall promptly vacate the area when ordered to do so by the Navy or Coast Guard. Vessels shall not enter the area during periods scheduled for firing as published in local Notice to Mariners.

(2) Except in an emergency, no vessel shall anchor in the area without first obtaining permission from the Commandant, Eleventh Naval District, or from the Senior Officer present in the anchorage who may grant permission to anchor not exceeding the period he himself is authorized to remain there. The Senior Officer present shall advise the Commandant, Eleventh Naval District, when and to whom he assigns a berth.

§204.200a Pacific Ocean, San Clemente Island, Calif.; naval danger zone off West Cove. (a) The danger zone. The waters of the Pacific Ocean in an area about one-half mile off the west coast of San Clemente Island basically outlined as follows:

33°00′40″N.,	118°35′45″W.
32°57′40″N.,	118°34′25″W.
32°57′10″N.,	118°35′40″W.
33°00′10″N.,	118°37′00″W.
33°00′40″N.,	118°35′45″W.

(b) The regulations. (1) Intermittent firing may take place in the danger zone on any day from 8:00 a.m. until 1:00 p.m.

(2) Except as otherwise provided in this section, the danger zone will be open to fishing and general navigation.

(3) The operations officer, Naval Ordnance Test Station, Pasadena Annex, Pasadena, California, will announce firing schedules. Each week, public notices will be issued giving advance firing schedules. Such notices will appear in the local newspapers and in local "Notice to Mariners" and "Notice to Airmen." For the benefit of the fishermen and small-craft operators, announcements will be made on the marine radio.

(4) When a scheduled firing is about to be undertaken, fishing boats and other small craft will be contacted by surface patrol boats or aircraft equipped with a loudspeaker system. When so notified, all vessels shall leave the area immediately by the shortest route. Upon completion of firing or if the scheduled firing is cancelled for any reason, fishermen and small-boat operators will be notified as far in advance as possible by Marine Radio Broadcast.

(5) The regulations in this section shall be enforced by security personnel attached to the Naval Ordnance Test Station, Pasadena Annex, and by such agencies as may be designated by the Commandant, Eleventh Naval District, San Diego.

§204.200b Pacific Ocean, San Clemente Island, Calif.; naval danger zone off China Point. (a) The danger zone. The waters of the Pacific Ocean within an area beginning at China Point Light; extending in a direction of 200° true, 1.59 nautical miles; thence 308° true, 5.25 nautical miles; and thence 050° true to the shoreline.

(b) The regulations. (1) This area is used for shore bombardment by the U.S. Navy and vessels shall not enter the area during periods scheduled for firing, as published in local "Notice to Mariners".

(2) The regulations in this section shall be enforced by the Commandant, 11th Naval District and such agencies as he may designate.

§204.201a Pacific Ocean in the vicinity of Point Mugu, Calif.; naval small arms firing range. (a) The danger zone. A triangular area extending westerly into the waters of the Pacific Ocean from a point on the beach north of Point Mugu, California, described as follows: Beginning at latitude 34°05′32″, longitude 119°03′57″; thence southwesterly approximately 4,000 yards to latitude 34°04′22″, longitude 119°05′55″; thence northwesterly approximately 1,500 yards to latitude 34°05′01″, longitude 119°06′17″; thence northeasterly to the point of beginning.

(b) The regulations. (1) Range firing will normally take place between 6 a.m. and 6 p.m., Thursday through Monday, and between 6 a.m. and 11:30 p.m., Tuesday and Wednesday of each week. Within the above periods, firing will be conducted as determined by the Commanding Officer, U.S. Naval Construction Battalion Center, Port Hueneme, Calif.

(2) Except as otherwise provided in this section, the danger zone will be open to fishing and general navigation.

(3) The Commanding Officer, U.S. Naval Construction Battalion Center, Port Hueneme, California, will announce firing schedules. Each week, public notices will be issued giving advance firing schedules. Such notices will appear in the local newspapers and in local "Notice to Mariners," and "Notice to Airmen." For the benefit of fishermen and small-craft operators, announcements will be made on the marine radio.

(4) When a scheduled firing is about to be undertaken or is in progress, a large red flag will be displayed from the control tower situated at latitude 34°05'32", longitude 119°03'57", so as to be clearly visible for a distance of at least three (3) miles offshore. Safety observers will be on duty at all times when the warning flag is being displayed from the tower. Upon completion of firing, or if the scheduled firing is canceled for any reason, fishermen and small-boat operators will be notified as far in advance as possible by Marine Radio Broadcast.

(5) Vessels or other craft shall not enter or remain in the danger zone when the warning flag is being displayed unless authorized to do so by the range officer in the control tower.

(6) The regulations in this section shall be enforced by the Commandant, Eleventh Naval District, San Diego, California, and such agencies as he may designate.

§204.202 Pacific Ocean, Western Space and Missile Center (WSMC), Vandenberg AFB, Calif.; danger zone. (a) The area. (1) The waters of the Pacific Ocean in an area extending seaward from the shoreline a distance of about three nautical miles and basically outlined as follows:

Station
Point Sal–34°54'08"N., 120°40'15"W.
1–34°54'08"N., 120°44'00"W.
2–34°52'48"N., 120°44'00"W.
3–34°50'00"N., 120°40'30"W.
4–34°44'50"N., 120°42'15"W.
5–34°41'50"N., 120°40'12"W.
6–34°35'12"N., 120°42'45"W.
7–34°33'00"N., 120°41'05"W.
8–34°30'40"N., 120°37'29"W.
9–34°30'40"N., 120°30'10"W.
10-34°30'40"N., 120°37'29"W.
11-34°24'18"N., 120°30'00"W.
12-34°23'24"N., 120°27'05"W.
13-34°24'21"N., 120°24'40"W.
14-34°27'20"N., 120°24'40"W.
Point Sal–34°54'08"N., 120°40'15"W.

(2) The danger area described in paragraph (a)(1) of this section will be divided into zones in order that certain firing tests and operations, whose characteristics as to range and reliability permit, may be conducted without requiring complete evacuation of the entire area. These zones are described as follows:

(i) Zone 1. An area extending seaward about three nautical miles from the shoreline beginning at latitude 34°30'40", longitude 120°30'10"; thence due west to latitude 34°30'40", longitude 120°37'29"; thence due north to the shoreline at latitude 34°33'15", longitude 120°37'29".

(ii) Zone 2. An area extending seaward about three nautical miles from the shoreline beginning at latitude 34°33'15", longitude 120°37'29"; thence due south to latitude 34°30'40", longitude 120°37'29"; thence to latitude 34°33'00", longitude 120°41'05"; thence to latitude 34°34'32", longitude 120°42'30"; thence due east to the shoreline at latitude 34°34'32", longitude 120°39'03".

(iii) Zone 3. An area extending seaward about three nautical miles from the shoreline beginning at latitude 34°34'32", longitude 120°39'03"; thence due west to latitude 34°34'32", longitude 120°42'15"; thence to latitude 34°35'12", longitude 120°42'45"; thence to latitude 34°37'15", longitude 120°41'55"; thence due east to the shoreline at latitude 34°37'15", longitude 120°38'00".

(iv) Zone 4. An area extending seaward about three nautical miles from the shoreline beginning at latitude 34°37'15", longitude 120°38'00"; thence due west to latitude 34°37'15", longitude 120°41'55"; thence to latitude 34°40'00", longitude 120°40'50"; thence due east to the shoreline at latitude 34°40'00", longitude 120°36'45".

(v) Zone 5. An area extending seaward about three nautical miles from the shoreline beginning at latitude 34°40'00", longitude 120°36'45"; thence due west to latitude 34°40'00", longitude 120°40'50"; thence to latitude 34°41'50", longitude 120°40'12"; thence to latitude 34°44'50", longitude 120°42'15"; thence to latitude 34°45'28", longitude 120°42'05"; thence due east to the shoreline at Purisima Point latitude 34°45'28", longitude 120°38'15".

(vi) Zone 6. An area extending seaward about three nautical miles from the shoreline beginning at Purisima Point (latitude 34°45'28", longitude 120°38'15"); thence due west to latitude 34°45'28", longitude 120°42'05"; thence to latitude 34°50'00", longitude 120°40'30"; thence due east to the shoreline at latitude 34°50'00", longitude 120°36'30".

(vii) Zone 7. An area extending seaward about three nautical miles from the shoreline beginning at latitude 34°50'00", longitude 120°36'30"; thence due west to latitude 34°50'00", longitude 120°40'30"; thence to latitude 34°52'48", longitude 120°44'00"; thence to latitude 34° 54'08", longitude 120°44'00"; thence due east to Point Sal latitude 34°54'08", longitude 120°40'15".

(viii) Zone 8. An area extending seaward with a radius of three nautical miles centered at Purisima Point latitude 34°45'28", longitude 120°38'15".

(ix) Zone 9. An area extending seaward about 3 nautical miles from the shoreline beginning at latitude 34°30'40", longitude 120°30'10"; thence due west to latitude 34°30'40", longitude 120°37'29"; thence to latitude 34°26'56", longitude 120°33'06"; thence due east to the shoreline at latitude 34°26'56", longitude 120°28'10".

(x) Zone 10. An area extending seaward about 3 nautical miles from the shoreline beginning at latitude 34°26'56", longitude 120°28'10"; thence due west to latitude 34°26'56", longitude 120°33'06"; thence to latitude 34°24'18", longitude 120°30'00", thence to latitude 34°23'34", longitude 120°27'05"; thence shoreward to latitude 34°26'56", longitude 120°28'10".

(xi) Zone 11. An area extending seaward about 3 nautical miles from the shoreline beginning at latitude 34°26'56", longitude 120°28'10"; thence seaward to latitude 34°23'34", longitude 120°27'05"; thence to latitude 34°24'21", longitude 120°24'40"; thence due north to the shoreline at latitude 34°27'20", longitude 120°24'40".

(b) The regulations. (1) Except as prescribed in this section or in other regulations, danger zones will be open to fishing, location of fixed or movable oil drilling platforms and general navigation without restrictions.

(2) The impacting of missile debris from launch operations will take place in any one or any group of zones in the danger areas at frequent and irregular intervals throughout the year. The Commander, WSMC, will announce in advance, the closure of zones hazarded by missile debris impact. Such advance announcements will appear in the weekly "Notice to Mariners." For the benefit of fishermen, small craft operators and drilling platform operators, announcements will also be made on radio frequency 2182 kc, 2638 kc, VHF channel 6 (156.30 MHz), VHF channel 12 (156.60 MHz), and VHF channel 16 (156.80 MHz) for daily announcements. Additionally, information will be posted on notice boards located outside Port Control Offices (Harbormasters) at Morro Bay, Port San Luis, Santa Barbara, Ventura, Channel Islands, and Port Hueneme Harbors, and any established harbor of refuge between Santa Barbara and Morro Bay.

(3) All fishing boats, other small craft, drilling platforms and shipping vessels with radios are requested to monitor radio frequency 2182 kc, 2638 kc, VHF channel 6 (156.30 MHz), channel 12 (156.60 MHz), or channel 16 (156.80 MHz) while in these zones for daily announcements of zone closures.

(4) When a scheduled launch operation is about to begin, radio broadcast notifications will be made periodically, starting at least 24 hours in advance. Additional contact may be made by surface patrol boats or aircraft equipped with a loudspeaker system. When so notified, all vessels shall leave the specified zone or zones immediately by the shortest route.

(5) The Commander, WSMC, will extend full cooperation relating to the public use of the danger area and will consider every reasonable request for its use in light of requirements for national security and safety of persons and property.

(6) Where an established harbor of refuge exists, small craft may take shelter for the duration of zone closure.

(7) Fixed or movable oil drilling platforms located in zones identified as hazardous and closed in accordance with this regulation shall cease operations for the duration of the zone closure. The zones shall be closed continuously no longer than 72 hours at any one time. Such notice to evacuate personnel shall be accomplished in accordance with procedures as established between the Commander WSMC and the oil industry in the adjacent waters of the outer Continental Shelf.

(8) No seaplanes, other than those approved by the Commander, WSMC, may enter the danger zones during launch closure periods.

(9) The regulations in this section shall be enforced by personnel attached to WSMC and by such other agencies as may be designated by the Commander, WSMC.

(10) The regulations in this section shall be in effect until further notice. They shall be reviewed again during September 1986.

§204.203 Pacific Ocean at San Miguel Island, Calif.; naval danger zone. (a) The area. The waters around San Miguel Island, extending about 3 miles seaward from the shoreline within the following points:

A–34°01'32"N., 120°23'17"W.
B–33°58'48"N., 120°23'17"W.
C–33°58'48"N., 120°15'00"W.
D–34°02'50"N., 120°15'00"W.
E–34°05'45"N., 120°17'25"W.
F–34°07'00"N., 120°20'05"W.
G–34°09'18"N., 120°23'17"W.
H–34°03'09"N., 120°23'17"W.

(b) Markers. Range markers, as delineated below, are installed at points A and H for navigational purposes for both surface vessels and aircraft:

(1) At point A two triangular markers are installed facing southward, 10 feet in length on each side, with red and white diagonal stripes, each marker mounted atop 80-foot poles spaced 100 yards apart, each pole being placed on the line of longitude 120°23'17"W. and near the southerly shoreline at latitude 34°01'32"N. The southernmost marker is 20 feet below the other.

(2) At point H two triangular markers are installed facing true north 10 feet in length on each side, with red and white diagonal stripes, each marker mounted atop 80-foot poles spaced 100 yards apart, each pole being placed on the line of longitude 120°23'17"W. and near the northwesterly shoreline at latitude 34°03'09"N. The northernmost marker is 20 feet below the other.

(c) The regulations. (1) Except as prescribed in this section or in other regulations, the danger zone will be open to fishing and general navigation. Firing between designated hours is expected to be intermittent, and when safe to do so, commercial fishing boats and other small craft will be granted permission to proceed through the danger zone. All vessels permitted to enter the zone during a scheduled firing period, other than those owned or operated by the U.S. Government, shall proceed across the zone by the most direct route and clear the area as soon as possible. When firing is not scheduled, the zone may be occupied without restriction.

(2) The anchoring, stopping, or loitering of any vessel, fishing boat, or recreational craft within the danger zone during scheduled firing hours is expressly prohibited.

(3) The firing of missiles will take place in the danger area at frequent and irregular intervals throughout the year. The Commander, PMR, will announce weekly missile firing schedules. Such notices will appear in the local newspapers and in "Notices to Mariners." Announcements will also be made on radio frequency 2638 kHz, commencing 24 hours prior to and during firing operations. Status of the zone and/or permission to enter, may be requested by calling "Plead Control" on 2638 kHz or by calling the PMR on telephone number 488-3511, extension 7315. Additionally, firing notices for the zone will be published on bulletin boards located outside Port Control Offices at Santa Barbara, Port San Luis, Morro Bay, Port Hueneme, Santa Monica and at the Ventura and Channel Islands marinas.

(4) When a scheduled firing is about to be undertaken, surface craft in the zone will be informed by surface patrol boats or aircraft equipped with a loudspeaker system. All vessels shall leave the specified zone immediately by the shortest route.

(5) The Commander, PMR, will extend full cooperation relating to the public use of the danger zone area and will fully consider every reasonable request for its use in light of requirements for national security and safety of persons and property.

(6) No seaplanes, other than those approved for entry by the Commander, PMR, may enter the danger zone during firing periods.

(7) Landing or going ashore on San Miquel Island is specifically prohibited without prior permission of the Commander, PMR. Applications for such permission should be made to: Commander, Pacific Missile Range, Attention: Code 127, Point Mugu, Calif., 93041.

(8) The regulations in this section shall be enforced by personnel attached to the Pacific Missile Range, Point Mugu, Calif., and by such other agencies as the Commandant, 11th Naval District, San Diego, Calif., may designate.

(9) The regulations in this section shall be in effect until July 1, 1980, and shall be reviewed in May 1980 to determine the continuing need.

§204.205 Monterey Bay, Calif. (a) Firing range, Fort Ord, Calif.–(1) The danger zone. (i) A rectangular area in Monterey Bay, the southerly limit of which is an extension seaward of the southerly line of the Fort Ord Military Reservation boundary and bears 307° true, 8,000 yards from a point on the shore at latitude 36°37′47″, longitude 121°50′28″, and the northerly limit of which is a line bearing 307° true, 8,000 yards, from a point on the shore at latitude 36°41′57″, longitude 121°48′30″, opposite Marina, Monterey County, Calif. The seaward boundary is a straight line joining the outer ends of the southerly and the northerly boundaries at the 8,000 yard range and is approximately parallel to the shore.

(ii) The danger zone is divided into a short range area, extending seaward from the shore a distance of 5,000 yards measured along the southerly and northerly boundaries, and a long range area embracing the entire danger zone.

(2) The regulations. (i) The 5,000 yard short range area is prohibited to all vessels and craft, except those authorized by the enforcing agency, each week, between dawn and midnight from Monday through Friday and between dawn and dusk on Saturday and Sunday.

(ii) The area between the 5,000 yard short range and the 8,000 yard seaward boundary of the danger zone may be used at all times for navigation and fishing, except when advance notice of intention to use this area has been given by the enforcing agency by one or more of the following means.

(a) Notice published in Monterey County and Santa Cruz County daily newspapers, at least two days in advance of the date of said use.

(b) Display of red flags at Indian Head Beach and near the Point Pinos Lighthouse.

(c) Radio Broadcast.

(d) Notice to individual craft by a visit of a United States vessel.

(e) Telephone advice to such fishermen's organizations as may request, in writing, that such advice be given.

(iii) The regulations in this paragraph will be enforced by the Commanding General, Fort Ord, California.

(b) Navy mining operations area–(1) The danger zone. Shoreward of a line beginning at the stack at about latitude 36°58′06″, longitude 121°54′06″; thence 230° true, 6.0 miles; thence 140° true, 7.5 miles; thence 50° true to the shore.

(2) The regulations. The danger zone will be used for training in various phases of mine warfare operations. During the period from August 1 to February 15, inclusive, each year, no operations will be carried on which will involve placing any obstructions in the water nor will any operations be carried on at night. During the period from February 16 to July 31, inclusive, each year, operations may be carried on which will involve laying exercise mines and other moored or bottom obstructions. In each case when moored or bottom obstructions are laid a notice to mariners will be issued giving notice of their approximate location within the danger zone, and vessels shall keep clear.

§204.215 San Pablo Bay, Calif.; target practice area, Mare Island Naval Shipyard, Vallejo. (a) The danger zone. A sector in San Pablo Bay adjacent to the westerly shore of Mare Island with a radius of 4,700 yards, centered at a point bearing 316°true, 3,605 yards, from Mare Island Strait Light 1, with limiting true bearings from that center of 266°30′ and 222°.

(b) The regulations. The Commander, Mare Island Naval Shipyard, Vallejo, California, will conduct target practice in the area at intervals of which the public will be duly notified. At such times vessels shall stay clear.

§204.216 San Pablo Bay, Calif.: gunnery range, Naval Inshore Operations Training Center, Mare Island, Vallejo. (a) The danger zone. A sector in San Pablo Bay delineated by lines joining the following points:

38°02′08″N., 122°25′17″W.
38°02′21″N., 122°22′55″W.
38°05′48″N., 122°19′34″W.
38°07′46″N., 122°23′23″W.

Note.–The danger zone will be used until September 30, 1982, after which it shall be subject to review to determine the further need thereof.

(b) The Regulations. The Commanding Officer, Coastal River Division Eleven, Department of the Navy, Mare Island, Vallejo, California, will conduct gunnery practice in the area during the period April 1 through September 30, between the hours of 10 a.m. and 3 p.m. on the first Wednesday of each month and the third full weekend (Saturday and Sunday) of June. No vessels shall enter or remain in the danger zone during the above stated periods except those vessels connected with the gunnery practice operations. All firing will be from the southerly portion of the danger zone in a northerly direction, and only during good visibility. The public will be notified prior to each firing by a Notice to Mariners issued by the U.S. Coast Guard and the area will be patrolled by boat and searched by radar to insure a clear range. A safety officer will always be aboard the firing boat to guarantee that all safety precautions are observed. The regulations in this section will be enforced by the Commandant, 12th Naval District and such agencies as he may designate.

§204.220 Strait of Juan de Fuca, Washington; air-to-surface weapon range, restricted area. (a) The restricted area. A circular area immediately west of Smith Island with a radius of 1.25 nautical miles having its center at latitude 48°19′11″North and longitude 122°54′12″West. In the center of the area will be located a lighted and radar reflective buoy to serve as a navigational aid to mariners. The area will be used for air-to-surface target practice using non-explosive training devices.

(b) The regulations. (1) No vessel or other watercraft shall enter or remain within the designated restricted area between 0700 and 2400 hours daily, local time except as authorized by the enforcing agency and as follows: The area will be open to commercial gill net fishing during scheduled fishing periods from 15 June through 15 October annually. The October 15 closure date will be extended by the enforcing agency if determined as advantageous to the commercial gill net fishing by the Washington State Department of Fisheries.

(2) Prior to each target practice operation the restricted area will be patrolled by naval aircraft. Those vessels found within the restricted area will be overflown by the aircraft at an altitude of not less than 300′ in the direction in which the unauthorized vessel is to proceed to clear the area.

(c) The regulations in this section shall be enforced by the Commandant, Thirteenth Naval District, Seattle, Washington, and such agencies as he may designate.

§204.222 Hood Canal and Dabob Bay, Wash.; naval non-explosive torpedo testing areas. (a) Hood Canal in vicinity of Bangor–(1) The area. All waters of Hood Canal between latitude 47°46′00″ and latitude 47°42′00″, exclusive of navigation lanes one-fourth nautical mile wide along the west shore and along the east shore south from the town of Bangor (latitude 47°43′28″).

(2) The regulations. (i) The area will be used intermittently by the Navy for non-explosive torpedo ranging. Launching will be conducted only between 8 a.m., and sunset on days other than Saturdays, Sundays, and holidays. At no time will the navigation lanes generally paralleling the shore be closed to navigation.

(ii) Navigation will be permitted within the area at all times except when naval exercises are in progress. No vessel shall enter or remain in the area when such exercises are in progress. Prior to commencement of an exercise, the Navy will make an aerial or surface reconnaissance of the area. Vessels underway and laying a course through the area will not be interfered with, but they shall not delay their progress. Vessels anchored or cruising in the area and vessels unobserved by the Navy reconnaissance which enter or are about to enter the area while a torpedo is in the water will be contacted by a Navy patrol boat and advised to steer clear. Torpedoes will be tested only when all vessels or other craft have cleared the area.

(iii) When operations are in progress, use of the area will be indicated by the presence of Naval vessels flying a "Baker" (red) flag.

(iv) Notices of temporary suspension and revival of operations will be published in local newspapers and in Notice to Mariners published by the United States Coast Guard.

(b) Dabob Bay in the vicinity of Quilcene–(1) The area. All waters of Dabob Bay beginning at latitude 47°39′27″, longitude 122°52′22″; thence northeasterly to latitude 47°40′19″, longitude 122°50′10″; thence northeasterly to a point on the mean high water line at Takutsko Pt.; thence northerly along the mean high water line to latitude 47°48′00″; thence west on latitude 47°48′00″ to the mean high water line on the Bolton Peninsula; thence southwesterly along the mean high water line of the Bolton Peninsula to a point on longitude 122°51′06″; thence south on longitude 122°51′06″ to the mean high water line at Whitney Pt.; thence along the mean high water line to a point on longitude 122°51′15″; thence southwesterly to the point of beginning.

(2) The regulations. (i) Propeller-driven or other noise-generating craft shall not work their screws or otherwise generate other than incidental noise in the area during periods of actual testing, which will be indicated by flashing red beacons at strategic locations, and all craft shall keep well clear of vessels engaged in such testing.

(ii) No vessel shall trawl or drag in the area.

(iii) No vessel shall anchor in the area except between the shore and the 10-fathom depth line.

(iv) Operations will normally be confined to the period from 9:30 a.m., to 2:30 p.m., on Mondays through Fridays, and will normally consist of intermittent tests of less than 30 minutes duration, with boat passage permitted between tests. Transits of log-tows and other slow-moving traffic will be arranged on a mutually satisfactory individual basis as appropriate. Emergencies or high-priority projects may occasionally cause operations outside the periods specified above. No operations will be conducted on Sundays.

(c) The regulations in this section shall be enforced by the Commandant, Thirteenth Naval District, and such agencies as he may designate.

§204.223 Pacific Ocean, Hawaii; danger zones. (a) Danger zones–(1) (Reserved)

(2) (Reserved)

(3) Aerial bombing and strafing target surrounding Kaula Rock, Hawaii. The waters within a circular area with a radius of three (3) miles having its center on Kaula Rock at latitude 21°39'30", longitude 160°32'30".

(4) Aerial bombing target and naval shore bombardment area, Kahoolawe Island, Hawaii. The waters adjacent to Kahoolawe Island within the area encompassed by the following coordinates beginning at latitude 20°37'30", longitude 156°32'48"; thence to latitude 20°34'48", longitude 156°30'24"; thence to latitude 20°28'54", longitude 156°30'30"; thence to latitude 20°28'06", longitude 156°41'48"; thence to latitude 20°30'30", longitude 156°44'12"; thence to latitude 20°33'12", longitude 156°44'30"; thence to latitude 20°37'30", longitude 156°36'24"; thence to the beginning coordinates.

(b) The regulations. (1) No vessel or other craft shall enter or remain in any of the areas at any time except as authorized by the enforcing agency.

(c) Enforcing agency. The regulations in this section shall be enforced by Commander, Third Fleet, Pearl Harbor, Hawaii 96860, and such agencies as he/she may designate.

§204.224 Pacific Ocean, Island of Oahu, Hawaii; danger zone. (a) The danger zone. Beginning at point of origin at Kaena Point Light in latitude 21°34'42"N., longitude 158°16'54"W.; thence on a bearing of 282°30' True to latitude 21°38'N., longitude 158°33'W.; thence along the arc of a circle centered at Kaena Point Light to latitude 21°42'30"N., longitude 158°03'W.; thence on a bearing of 228° True to latitude 21°35'33"N., longitude 158°11'30"W.; thence to point of origin.

(b) The regulations. (1) The area will be closed to all shipping on specific dates to be designated for actual firing and no vessel or other craft shall enter or remain in the area during the times designated for firing except as may be authorized by the enforcing agency. Notification to maritime interests of specific dates of firing will be disseminated through the U.S. Coast Guard media of the Local Notice to Mariners and the NOTAMS published by the Corps of Engineers. On dates not specified for firing, the area will be open to normal maritime traffic.

(2) The regulations of this section shall be enforced by the Commanding General, United States Army, Hawaii/25th Infantry Division, APO 957, and such agencies as he may designate.

§204.224a Pacific Ocean at Barber's Point, Island of Oahu, Hawaii; danger zone. (a) The danger zone. The waters within a rectangular area beginning at a point in latitude 21°17'56"N., longitude 158°05'21"W.; thence to latitude 21°17'30"N., longitude 158°05'21"W.; thence to latitude 21°17'58"N., longitude 158°02'49"W.; thence to latitude 21°18'24"N., longitude 158°02'49"W.; thence along the shoreline at the highwater mark along the southerly boundary of Naval Air Station, Barbers Point, to the point of beginning.

(b) The regulations. (1) The area is closed to all surface craft, swimmers, divers and fishermen except to craft and personnel authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Commanding Officer, Naval Air Station, Barber's Point, Hawaii 96862, and such agencies as he/she may designate.

§204.224b Pacific Ocean at Keahi Point, Island of Oahu, Hawaii; danger zone. (a) The danger zone. The waters within an area beginning at a point in latitude 21°18'21.4"N., longitude 157°59'14.2"W.; thence to latitude 21°18'11"N., longitude 158°00'17.5"W.; thence to latitude 21°17'11.8"N., longitude 158°00'06.5"W.; and thence to latitude 21°17'22.5"N., longitude 157°59'03.1" W.

(b) The regulations. (1) The area is closed to all surface craft, swimmers, divers, and fishermen except to craft and personnel authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Commander, Explosive Ordnance Disposal Group One, Barbers Point, Hawaii 96862, and such agencies as he/she may designate.

§204.224c Marine Corps Air Station, (MCAS) Kaneohe Bay, Island of Oahu, Hawaii-Ulupau Crater Weapons Training Range Danger Zone. (a) The Danger Zone. The waters within a sector extending seaward a distance of 3,900 yards between radial lines bearing 352° true and 61° true, respectively, from a point on Mokapu Peninsula at latitude 21°27'17"N., longitude 157°43'51"W., exclusive of the existing 500 yard wide prohibited area. The interface between the existing 500 yard prohibited area and this danger zone is defined by three points having the following coordinates.

Point A: Latitude 21°27'59"N., Longitude 157°43'56"W.

Point B: Latitude 21°27'52"N., Longitude 157°43'02"W.

Point C: Latitude 21°27'38"N., Longitude 157°43'12"W.

(b) The regulations. (1) Weapons firing at the Ulupau Crater Weapons Training Range may occur at any time between 6:00 a.m. and 11:00 p.m., Monday through Friday, and between 6:00 a.m. and 6:00 p.m., Saturday and/or Sunday, when required. Specific dates and hours for weapons firing, along with information regarding onshore warning signals, will be promulgated by the U.S. Coast Guard's Local Notice to Mariners. Information on weapons firing schedules may also be obtained by calling the Officer in Charge of the Range Training Facility, Headquarters and Headquarters Squadron, MCAS (telephone number 257-2067).

(2) Whenever hazardous weapons (machine guns) firing is scheduled and in progress during daylight hours, two large red triangular warning pennants will be flown at each of two highly visible and widely separated locations on the shore at Ulupau Crater.

(3) Whenever tactical weapons (exclusive of machine guns) firing is scheduled and in progress during daylight hours, a single large red rectangular warning flag will be flown at the two separate locations on the shore.

(4) Whenever any weapons firing is scheduled and in progress during periods of darkness, flashing red warning beacons will be displayed on the shore at Ulupau Crater.

(5) Boaters will have complete access to the danger zone whenever there is no weapons firing scheduled, which will be indicated by the absence of any warning flags, pennants, or beacons displayed ashore.

(6) The danger zone is not considered safe for boaters whenever hazardous weapons (machine guns) firing is in progress. Hazardous weapons firing will usually be scheduled approximately twice a month, on nonconsecutive weekdays, for about eight hours on each occasion. Boaters shall expeditiously vacate the danger zone at best speed and by the most direct route whenever hazardous weapons firing is scheduled. Passage of vessels through the danger zone when hazardous weapons firing is in progress will be permitted, but boaters shall proceed directly through the area at best speed. Hazardous weapons firing will be suspended as long as there is a vessel in the danger zone. Whenever a boater disregards the publicized warning signals that hazardous weapons firing is scheduled, the boater will be personally requested to expeditiously vacate the danger zone by MCAS Kaneohe Bay military personnel utilizing a bull-horn from either a Marine helicopter or Navy crash boat.

(7) The danger zone may be occupied for extended periods and with caution at individual risk whenever tactical weapons (exclusive of machine guns) firing is scheduled and in progress because of the remote possibility of a rifle round from an accidental discharge impacting outside the limits of the existing prohibited areas.

(8) Observation posts will be manned whenever any weapons firing is scheduled and in progress. Visibility will be sufficient to maintain visual surveillance of the entire danger zone and for an additional distance of 5 miles in all directions whenever weapons firing is in progress.

(c) The Enforcing Agency. The foregoing regulations shall be enforced by the Commanding Officer, MCAS Kaneohe Bay and such agencies as he/she may designate.

§204.225a Pacific Ocean at Barking Sands, Island of Kauai, Hawaii, missile range facility. (a) The danger zone. The waters within an area beginning at latitude 22°03′15″N., longitude 159°47′15″W.; thence southerly along the shoreline to latitude 22°02′45″N., longitude 159°47′18″W.; thence westerly to latitude 22°02′30″N., longitude 159°51′30″W.; thence northeasterly to latitude 22°06′30″N., longitude 159°49′30″W.; and thence southeasterly to point of beginning.

(b) Markers. (1) Range markers at the control point at latitude 22°03′17.4″N., longitude 159°47′12.2″W., are separated 300 feet (one pole 95.5 feet northwest and the other pole 204.5 feet southeast of this point) along a line bearing 327°10′ True.

(2) Range markers at the control point at latitude 22°02′44.5″N., longitude 159°47′16.4″W., are separated 300 feet (one pole 75 feet west and the other pole 225 feet east of this point) along a line bearing 266°20′ True.

(3) The range marker poles seaward from each control point are 25 feet in height above ground level. The other two poles are 45 feet above ground level.

(4) Each range marker consists of a 10-foot equilateral triangle with alternate red and white diagonal stripes.

(c) The regulations. Entry into the area by any person, boat, vessel or other craft is prohibited at all times. Special permission for transit through the area by the most direct route may be obtainable on an individual basis, by prior arrangement with the Commanding Officer, Pacific Missile Range Facility, Hawaiian Area, Barking Sands, Kekaha, Kauai, Hawaii 96752.

Part 207–Navigation Regulations

§207.612 San Diego Harbor, Calif.; restricted areas.

(a) (Reserved)

(b) Restricted area at U.S. Naval Degaussing Station. (1) The area. That portion of San Diego Bay near Point Loma, inclosed by lines connecting the following points, which are rectangular coordinates and are referred to U.S. Coast and Geodetic Survey station "Old Town" as their origin:

"a"	S. 18,738.80,	W. 16,299.50.
"b"	S. 18,817.60,	W. 15,791.30.
"c"	S. 19,376.09,	W. 14,270.73.
"d"	S. 20,023.15,	W. 14,462.94.
"e"	S. 21,080.24,	W. 14,333.14.
"f"	S. 22,074.40,	W. 16,371.48.

(2) The regulations. (i) There shall be no introduction of external magnetic field sources within the area.

(ii) Craft of any size shall not be excluded from transiting the area. However, they shall proceed through the area by the most direct route without delay or loitering. On occasion, access to the bait barges may be delayed for intermittent periods not exceeding 30 minutes.

(iii) No craft of any size shall lay-to or anchor within the area except on prior permission granted by the Officer in Charge, U.S. Naval Degaussing Station.

(c) Restricted area between Ballast Point and Zuniga Point–(1) The area. An area in San Diego

Bay between Ballast Point and Zuniga Point inclosed by lines connecting the following stations:

Station
A–32°41'17"N., 117°13'58"W.
B–32°41'19"N., 117°13'36.5"W.
C–32°41'01"N., 117°13'34"W.
D–32°40'59"N., 117°13'55"W.
E–32°41'03"N., 117°13'56"W.
A–32°41'17"N., 117°13'58"W.

(2) The regulations. (i) No vessel shall anchor within the restricted area at any time.

(ii) Dredging, dragging, seining, other fishing operations, and other activities not under the direction of the United States, which might foul underwater installations within the restricted area, are prohibited.

(iii) All tows entering the restricted area shall be streamed and shortened to the seaward of the area and towing appendages and catenaries shall not be dragged along the bottom while proceeding through the area.

(iv) All vessels entering the restricted area shall proceed across the area by the most direct route and without unnecessary delay.

(d) Enforcement. The regulations in this section shall be enforced by the Commandant, Eleventh Naval District, San Diego, California, and such agencies as he may designate.

§207.612a San Diego Harbor, Calif.; naval restricted area adjacent to Point Loma. (a) The area. That portion of San Diego Bay southerly of Ballast Point, exclusive of the southwesterly portion of the restricted area described in §207.612 (b) located westerly of the entrance channel, bounded on the west by the shoreline at Point Loma, on the east by the entrance channel west project line, and on the south by latitude 32°40'.

(b) The regulations. (1) The area is reserved for anchorage of vessels of the U.S. Government and authorized harbor pilot and patrol boats. All other craft may navigate and operate through the area, and temporary mooring of vessels (not to exceed 24 hours) is permissible.

(2) No other vessels shall anchor or moor permanently in the area except by special permission obtained in advance from the Commander, Naval Base, San Diego, Calif.

(3) The regulations in this section shall be enforced by the Commandant, 11th Naval District, San Diego, Calif., and such agencies as he may designate.

§207.612b Pacific Ocean off Point Loma, Calif.; naval restricted area. (a) The area. The waters of the Pacific Ocean within an area extending southerly from Point Loma, California, described as follows: Beginning at latitude 32°39'54", longitude 117°13'18"; thence southeasterly to latitude 32°34'31" longitude 117°09'41"; thence 270° true to longitude 117°16'40"; thence due north to latitude 32°39'54"; and thence 90° true to the point of beginning.

(b) The regulations. (1) No vessel shall anchor within the restricted area at any time without specific permission of the enforcing agency.

(2) Dredging, dragging, seining, and other similar operations within the restricted area are prohibited.

(3) The regulations in this section shall be enforced by the Commandant, Eleventh Naval District, San Diego, California, and such agencies as he may designate.

§207.613 Pacific Ocean; U.S. Navy restricted area in vicinity of Scripps Institution of Oceanography Pier, La Jolla, Calif. (a) The restricted area. An area in the Pacific Ocean at La Jolla, California, bounded as follows: Beginning at the seaward end of the Scripps Institution of Oceanography Pier, about 1.5 miles northeast of Point La Jolla Light; thence 205°07' true, 1,000 feet; thence 270°00' true, 4,009 feet; thence 00°00" true, 2,628 feet; thence 78°34' true, 3,568 feet; thence 138°00' true, 2,040 feet; thence 205°07' true, 1,009 feet, to the point of beginning. The corners of the restricted area will be plainly marked with lighted marker buoys by the United States Navy.

(b) The regulations. (1) No vessels, other than vessels operated by or for the United States or the Scripps Institution of Oceanography, shall anchor within the restricted area at any time.

(2) Dredging, dragging, seining, other fishing operations, and other activities not under the direction of the United States or the Scripps Institution of Oceanography, which might foul underwater installations within the restricted area, are prohibited.

(3) All vessels entering the restricted area, other than vessels operated by or for the United States or the Scripps Institution of Oceanography, shall proceed across the area by the most direct route and without unnecessary delay.

(4) This section shall be enforced by the Commandant, Eleventh Naval District, San Diego, California, and such agencies as he may designate.

§207.613a Pacific Ocean, U.S. Marine Corps Base, Camp Pendleton, California; restricted area. (a) The area. Beginning at the shoreline north of the boat basin, latitude 33°13'10", longitude 117°24'19"; thence westward to latitude 33°12'48", longitude 117°24'56"; thence southward to latitude 33°12'32", longitude 117°24'44"; thence eastward to latitude 33°12'47", longitude 117°24'17" (a point on the breakwater); thence northeastward along breakwater to latitude 33°12'58", longitude 117°24'09"; thence northward along shoreline to point of beginning.

(b) The regulations. (1) No vessels shall anchor within the restricted area at any time.

(2) Dredging, dragging, seining, fishing operations, and other activities, which might foul underwater installations within the restricted area, are prohibited.

(3) All vessels entering the restricted area shall proceed across the area by the most direct route and without unnecessary delay.

(4) The regulations in this section shall be enforced by the Commanding General, U.S. Marine Corps Base, Camp Pendleton, California, and such agencies as he may designate.

§207.613b Pacific Ocean, Camp Pendleton Boat

Basin, U.S. Marine Corps Base, Camp Pendleton, Calif.; restricted area. (a) The area. All of the waters of Camp Pendleton Boat Basin entrance channel lying northerly of a line between a light on the north Camp Pendleton jetty at latitude 33°12'22", longitude 117°24'07", and a light on the north Oceanside Harbor groin at latitude 33°12'29", longitude 117°23'55".

(b) The regulations. (1) The area is reserved exclusively for use by vessels owned or operated by the Federal Government. Permission to enter the area must be obtained from the enforcing agency.

(2) The regulations in this section shall be enforced by the Commanding General, U.S. Marine Corps Base, Camp Pendleton, California, or such agencies as he may designate.

§207.614 Pacific Ocean off the east coast of San Clemente Island, Calif.; naval restricted area. (a) The area. The waters of the Pacific Ocean within an area extending easterly from the east coast of San Clemente Island, California, described as follows: The northerly boundary to be a continuation, to seaward of the existing southerly boundary of the Naval Restricted Anchorage Area, as described in §110.218 of this chapter (Anchorage Regulations), to latitude 33°00.3'N., longitude 118°31.1'W.; thence to latitude 32°58.6'N., longitude 118°30.0'W.; thence to latitude 32°57.9'N., longitude 118°31.3'W. on the shoreline; thence northerly along the shoreline to point of beginning.

(b) The regulations. (1) No vessels, other than Naval Ordnance Test Station craft, and those cleared for entry by the Naval Ordnance Test Station, shall enter the area at any time except in an emergency, proceeding with extreme caution.

(2) Dredging, dragging, seining or other fishing operations within these boundaries are prohibited.

(3) No seaplanes, other than those approved for entry by Naval Ordnance Test Station, may enter the area.

(4) The regulations in this section shall be enforced by security personnel attached to the U.S. Naval Ordnance Test Station, China Lake, California, and by such agencies as may be designated by the Commandant, Eleventh Naval District, San Diego, California.

§207.615 Pacific Ocean around San Nicolas Island, Calif., naval restricted area. (a) The area. The waters of the Pacific Ocean around San Nicolas Island, Calif., extending about 3 miles seaward from the shoreline, described as follows:

Point A-33°10'10"N., 119°24'20"W.
Point C-33°10'10"N., 119°31'10"W.
Point D-33°12'00"N., 119°35'30"W.
Point E-33°14'20"N., 119°37'40"W.
Point F-33°16'40"N., 119°38'10"W.
Point G-33°19'10"N., 119°37'10"W.
Point I-33°20'10"N., 119°31'10"W.
Point K-33°17'40"N., 119°24'50"W.
Point L-33°13'50"N., 119°21'50"W.

(b) Sections of Area. (1) ALPHA section is the northerly section of the area and is described as follows:

Point G-33°19'10"N., 119°37'10"W.
Point I-33°20'10"N., 119°31'10"W.
Point J-33°18'18"N., 119°26'29"W.
Point O-33°15'43"N., 119°28'40"W.
Thence northwesterly along shoreline to Point N
Point N-33°16'30"N., 119°30'40"W.
Point G-33°19'10"N., 119°37'10"W.

(2) BRAVO section is the westerly section of the area, and is described as follows:

Point N-33°16'30"N., 119°30'40"W.
Thence westerly, southerly and easterly along the shoreline to Point M
Point M-33°13'10"N., 119°29'40"W.
Point B-33°10'10"N., 119°29'40"W.
Point C-33°10'10"N., 119°31'10"W.
Point D-33°12'00"N., 119°35'30"W.
Point E-33°14'20"N., 119°37'40"W.
Point F-33°16'40"N., 119°38'10"W.
Point G-33°19'10"N., 119°37'10"W.
Point N-33°16'30"N., 119°30'40"W.

(3) CHARLIE section is the easterly section of the area, and is described as follows:

Point J-33°18'18"N., 119°26'29"W.
Point O-32°15'43"N., 119°28'40"W.
Thence easterly, southerly and westerly along the shoreline to Point M
Point M-33°13'10"N., 119°29'40"W.
Point B-33°10'10"N., 119°29'40"W.
Point A-33°10'10"N., 119°24'20"W.
Point L-33°13'50"N., 119°21'50"W.
Point K-33°17'40"N., 119°24'50"W.
Point J-33°18'18"N., 119°26'29"W.

(c) Markers. Range markers, as delineated below, are installed at Points M, N, and O for navigational purposes to indicate the boundaries between sections ALPHA, BRAVO, and CHARLIE.

(1) At Point M two triangular markers are installed facing southward, 10 feet in length on each side, with red and white diagonal stripes, each marker mounted atop 80-foot poles spaced 100 yards apart, each pole being located on the line of longitude 119°29'40"W. and near the southerly shoreline at latitude 33°13'10"N. The southernmost marker is 20 feet below the other.

(2) At Point N two triangular markers are installed facing northwesterly, 10 feet in length on each side, with red and white diagonal stripes, each marker mounted atop 80-foot poles spaced 100 yards apart, the poles being located near the northwesterly shoreline at latitude 33°16'30" N. and longitude 119°30'40" W. The northernmost marker is 20 feet below the other.

(3) At Point O two triangular markers are installed facing northeasterly, 10 feet in length on each side, with red and white diagonal stripes, each marker mounted atop 80-foot poles spaced 100 yards apart, the poles being located near the northeasterly shoreline at latitude 33°15'43"N. and longitude 119°28'40"W. The northernmost marker is 20 feet below the other.

(d) The regulations. (1) No seaplanes, other than those approved for entry by the Commander, Pacific Missile Range (COMPMR) may enter any section of the area.

(2) Subject to the provisions of paragraph (d) (4) of this section, relating to sections BRAVO and CHARLIE, no vessels other than Pacific Missile Range craft and those cleared for entry by COMPMR, or the Officer-in-Charge, San Nicolas Island shall enter any section of the area at any time except in an emergency, proceeding with extreme caution.

(3) Dredging, dragging, seining, or other fishing operations within ALPHA section of the area are prohibited at all times.

(4) Dredging, dragging, seining, or other fishing operations are allowed within the boundaries of BRAVO and CHARLIE sections at all times except when declared closed by COMPMR. Notice that sections BRAVO and/or CHARLIE are closed to fishing shall be given by publication of notices to mariners, or may be obtained by monitoring standard Coast Guard radio broadcasts or by contacting the Pacific Missile Range by telephone or radio. Boats must remain at least 300 yards from the shoreline of San Nicolas Island at all times. Nothing in this provision shall be construed as authorization for personnel to land on San Nicolas Island, except in an emergency.

(5) The regulations in this section shall be enforced by personnel attached to the Pacific Missile Range, Point Mugu, Calif., and by such agencies as may be designated by the Commandant, 11th Naval District, San Diego, Calif.

§207.617 Long Beach Harbor, Calif.; naval restricted area. (a) The area. All the waters between the Navy mole and Terminal Island to the westward of longitude 118°13′10″.

(b) The regulations. (1) The area is reserved exclusively for use by naval vessels. Permission to enter the area must be obtained from the enforcing agency.

(2) The regulations in this section shall be enforced by the Commander, U.S. Naval Base Los Angeles, Long Beach, California, and such agencies as he may designate.

§207.640 San Francisco Bay, San Pablo Bay, Carquinez Strait, Suisun Bay, San Joaquin River, and connecting waters, Calif. (a) San Francisco Bay north of Alcatraz Island; submarine operating area–(1) The area. Bounded as follows: North boundary, latitude 37°50′38″; east boundary, longitude 122°25′00″; south boundary, latitude 37°50′00″; west boundary, longitude 122°26′10″;

(2) The regulations. Prior notification of the dates and times of all operations will be made by local notice to mariners. A patrol boat will direct the movement of vessels passing in the vicinity of the operating area by means of signal light and loud hailer. Vessels traversing this area shall be alert and comply with the orders of the patrol boat. The regulations in this paragraph shall be enforced by the Commandant, Twelfth Naval District, and such agencies as he may designate.

(b) (Reserved)

(c) San Francisco Bay in vicinity of Hunters Point; naval restricted area–(1) The area. Bounded by the shore of the San Francisco Naval Shipyard and the following lines: Beginning at a point on the northerly shore of the Shipyard bearing 292°40′, 950 yards, from Hunters Point Light; thence 35°27′, 730 yards to the U.S. Pierhead Line; thence 142°55′, 1,300 yards, along the Pierhead Line; thence 180°, 2,450 yards, to the San Francisco-San Mateo County Line; thence 270°, 430 yards, along the County Line; thence 305°27′, 1,313 yards, to and along the southwesterly side of South Basin; and thence due north, 413 yards, to the southwesterly shore of the Shipyard.

Note: All bearings in this section are referred to true meridian.

(2) The regulations. No vessel or other craft, except vessels of the United States Government or vessels duly authorized by the Commander, San Francisco Naval Shipyard, shall navigate, anchor, or moor in this area.

(d) San Francisco Bay at South San Francisco; seaplane restricted area–(1) The area. Bounded by the westerly shore of South San Francisco Bay and the following lines: Beginning at a point on shore bearing 152°30′, 1,750 yards, from Aviation Beacon "Aero" at San Francisco Airport; thence to points which are the following bearings and distances from Aviation Beacon "Aero"; 99°30′, 9,070 yards; 81°30′, 6,530 yards; 41°30′, 6,100 yards; and 347°30′, 3,400 yards.

(2) The regulations. No surface watercraft shall be operated or anchored in this area except by specific permission of the Commanding Officer, Coast Guard Air Station, South San Francisco. Persons desiring to navigate vessels across the area shall give advice of their intention to do so and make request to the Commanding Officer not less than four hours in advance of the time they desire to take the vessel across the area.

(e) (Reserved)

(f) San Francisco Bay and Oakland Inner Harbor; restricted areas in vicinity of Naval Air Station, Alameda–(1) The areas. (i) The waters of San Francisco Bay within 100 yards of the Naval Air Station, Alameda.

(ii) The waters of the entrance channel to Oakland Inner Harbor (San Antonio Estuary) between the westerly end of the rock wall on the south side of the channel and the easterly boundary of the Naval Air Station.

(2) The regulations. (i) No vessel or other craft, except vessels of the United States Government or vessels duly authorized by the Commanding Officer, U.S. Naval Air Station, Alameda, California, shall navigate, anchor, or moor in the area described in paragraph (f)(1)(i) of this section.

(ii) No vessel without special authority from the Commander, Twelfth Coast Guard District, shall lie, anchor, or moor in the area described in paragraph (f)(1)(ii) of this section. Vessels may proceed through the entrance channel in process of ordinary navigation or may moor alongside wharves on the Oakland side of the channel.

(g) Oakland Inner Harbor adjacent to Alameda Facility, Naval Supply Center, Oakland; restricted area–(1) The area. Within 100 feet of the Alameda Facility wharf.

(2) The regulations. No vessel or other craft, except vessels of the U.S. Government or vessels duly authorized by the Commanding Officer, Naval Supply Center, Oakland, shall enter this area.

(g–1) Oakland Harbor in vicinity of Naval Supply Center, Oakland; restricted area and navigation–(1) The area. Bounded by the shore of the Naval Supply Center and the following lines: Beginning at a point on the north shore located at about latitude 37°48′26″, longitude 122°19′34″; thence 225°12′, 290 yards; and thence 173°10′, 620 yards to a point on the south shore at about latitude 37°48′02″, longitude 122°19′39″.

(2) The regulations. (i) No vessel or other craft, except vessels of the U.S. Government or vessels duly authorized by the Commanding Officer, Naval Supply Center, Oakland, shall enter this area.

(ii) All vessels over 1,000 tons displacement, bound for the Naval Supply Center, Oakland, shall use a qualified pilot regularly licensed for the waters of Oakland Harbor.

(g–2) Oakland Outer Harbor adjacent to the Military Ocean Terminal, Bay Area, Pier No. 8 (Port of Oakland Berth No. 10); restricted area–(1) The area. Within 100 feet of the pier.

(2) The regulations. No vessel, or other craft, except vessels of the U.S. Government or vessels duly authorized by the Commander, Oakland Army Base, shall enter this area.

(g–3) Oakland Outer Harbor adjacent to the Oakland Army Base; restricted area–(1) The area. Within 100 feet of the wharves, piers or shore.

(2) The regulations. No vessel or other craft, except vessels of the U.S. Government or vessels duly authorized by the Commander, Oakland Army Base, shall enter this area.

(h) San Francisco Bay between Treasure Island and Yerba Buena Island; naval restricted area–(1) The area. All the water of the cove bounded by the south shore of Treasure Island, the north shore of Yerba Buena Island, and the connecting causeway, west of a line extending from the southeast corner of the most southerly of the four finger piers along the east side of Treasure Island, at about latitude 37°49′11″, longitude 122°21′40″, approximately 153°20′ to the northeasterly point of Yerba Buena Island, at about latitude 37°48′55″, longitude 122°21′30″.

(2) The regulations. No vessel or other craft, except vessels owned or operated by the United States Government or vessels duly authorized by the Commanding Officer, Naval Station, Treasure Island, shall enter the restricted area.

(i) San Francisco Bay adjacent to northeast corner of Treasure Island; naval restricted area–(1) The area. Beginning at the intersection of Pier 21 and the bulkhead line, thence northwesterly along the bulkhead to the northernmost point of Treasure Island; thence 288° true, 290 yards; thence 26° true, 475 yards; thence 115°30′ true, 520 yards; thence 152° true, 500 yards to Pier 21; thence along the pier to the point of beginning.

(2) The regulations. No vessels, except those engaged in naval operations, shall lie, anchor, moor or unnecessarily delay in the area. Vessels may pass through the area in the process of ordinary navigation except as directed by patrol boats. The regulations in this paragraph shall be enforced by the Commandant, Twelfth Naval District, and such agencies as he may designate.

(j) San Francisco Bay in vicinity of NSC Fuel Department, Point Molate; restricted area–(1) The area. Bounded by the easterly shore of upper San Francisco Bay and the following lines: Beginning at a point on shore bearing 17° 800 yards, from "Tree" at Molate Point thence 270°, 870 yards; thence 189° 1,100 yards; and thence 123° to the shore.

(2) The regulations. Vessels not operating under supervision of the local military or naval authority or public vessels of the United States shall not enter this area except by specific permission of the Commanding Officer, Naval Supply Center, Oakland.

(k) (Reserved)

(l) San Pablo Bay, Carquinez Strait and Mare Island Strait in vicinity of U.S. Naval Shipyard, Mare Island; restricted area–(1) The area. The waters of San Pablo Bay, Carquinez Strait, and Mare Island Strait, within 100 yards of the shore of that part of the Navy Yard, Mare Island, south of the causeway between the City of Vallejo and Mare Island and extending continuously therefrom southeasterly, southwesterly, and northwesterly around the Navy Yard to its northwesterly limit on the waters of San Pablo Bay, and the waters within 50 yards of any part of the berthing piers at the Navy Yard.

(2) The regulations. No vessel or other craft, except vessels of the United States Government or vessels duly authorized by the Commander, Mare Island Naval Shipyard, Vallejo, California, shall navigate, anchor, or moor in this area.

(m) (Reserved)

(n) Suisun Bay at Naval Weapons Station, Concord; restricted area–(1) The area. Beginning at a point on the shore and on the easterly side of the mouth of a small slough (known as Hastings Slough) bearing 189°, 2,412 yards from Tripon at Preston Point on Roe Island; thence 340°30′, 400 yards to the shoreline of the westerly of the two Seal Islands; thence 60°30′, 940 yards; thence 75°, 1,650 yards; thence 102°, 1,850 yards; thence 99°, 1,880 yards; thence 180°, 435 yards, to the shoreline; thence following the high water shoreline in a general westerly direction to the point of beginning.

(2) The regulations. Vessels and other craft not operating under the authority of the local military or naval authority shall not enter, lie to, anchor, or moor in this area except by specific permission of the Commanding Officer, Naval Weapons Station, Concord.

(o) (Reserved)

(p) (Reserved)

(q) Sacramento Deep Water Ship Channel Barge Lock and Approach Canals; use, administration and navigation–(1) General. The lock, its approach channels and all its appurtenances, including the highway and railroad bridge, shall be under the jurisdiction of the District Engineer, U.S. Army Engineer District, Sacramento, Federal and Courts Building, 650 Capitol Avenue, Sacramento, California. His designated representative at the locality shall be the lockmaster, who will be in immediate charge of movement and position of all water traffic while at or near the locks and in the barge canals.

(2) Immediate control. The lockmaster shall be charged with the immediate control and management of the lock, bridge, and of the area set aside as the lock area, including the entrance channels. He shall see that all laws, rules, and regulations for the use of the lock, bridge and the lock area are duly complied with, to which end he is authorized to give all necessary orders and directions in accordance therewith, both to employees of the Government and to any and every person within the Government lock area. Crews shall render such assistance in the lockage of their craft as may be required by the lockmaster.

(3) Signals–(i) Sound. All craft desiring lockage shall signal by two long blasts followed by two short blasts of the whistle, delivered at a distance of one-half mile from the lock. When the lock is ready for entrance, notice will be given by one long blast from the control house. Permission to leave the lock will be one short blast given by the lockmaster.

(ii) Visual lock traffic signals. Visual signals are located outside of each lock gate on the north guide wall, and will be used in conjunction with sound signals. When the red light is flashing, lock cannot be made ready for entrance immediately, vessel must stand clear. When the amber light is flashing, lock is being made ready, prepare for lockage. When the green light is flashing, lock is ready for entrance, the vessel may proceed with caution into the lock.

(iii) Visual river traffic signals. Visual signals are located on the south bank of the barge canal at the confluence with the Sacramento River and also 1,950 feet upstream on the west bank of the Sacramento River. When the red light is on, a riverbound vessel of a size making passing in the canal hazardous is in the lock or canal. Approaching vessel shall stand clear of canal to permit out-going vessel to pass. When the amber light is on, a riverbound vessel of a size to permit passing is in the lock or canal. Vessel may enter canal with caution. When the green light is on, vessel may enter canal and proceed under full control.

(iv) Radio. The lock is equipped with two-way radio operating on a frequency of 156.60 MHz. The frequency is monitored by the lock personnel. Vessels equipped with two-way radio may communicate with the crew operating the lock but communications or signals so received will only augment and not replace the sound and visual signals.

(4) Permissible dimensions of vessels and tows. The lock chamber has a maximum usable width of 86 feet and length of 600 feet. The sill at the harbor end and the bottom of the lock chamber are –13.0 feet elevation, CofE datum, and usually provides a depth of water ranging from 14.0 feet at LLW to 19.4 feet at HHW, with greater depths during large floods in the delta. The sill at the river end is at–10.0 feet elevation, CofE datum, and usually provides a depth of water ranging from 14.6 feet at LLW to 16.8 feet at HHW, with greater depths when the river is high. The depth of water at any time is indicated by staff gages located on the south wall of the lock, riverward and harborward of each lock gate and at the center of the lock. A vessel must not attempt to enter the lock if its beam or length is greater than indicated above, or if its draft exceeds the depth of water indicated by the gages, with due allowance for clearance.

(5) Precedence at lock. Ordinarily, craft will be locked through in order of arrival; however, depending upon whether the lock is full or empty, this precedence may be modified at the discretion of the lockmaster if boats are approaching from the opposite direction and are within reasonable distance of the lock at the time of the approach by the first boat. When several craft are to pass, precedence shall be given as follows:

First: Government owned or controlled craft.
Second: Commercial craft.
Third: Passenger boats.
Fourth: Small vessels and pleasure boats.

(6) Loss of turn. Boats that fail to enter the lock with reasonable promptness, after being authorized to do so, shall lose their turn.

(7) Multiple lockage. The lockmaster shall decide whether one or more vessels may be locked through at the same time.

(8) Speed. Vessels shall not be raced or crowded alongside another in the barge canals. When entering the barge canals and lock, speed shall be reduced to a minimum consistent with safe navigation. As a general rule, when a number of vessels are entering the lock, the following vessels shall remain at least 200 feet astern of the vessel ahead. No overtaking, except when directed by lockmaster will be permitted.

(9) Lockage of small boats–(i) General. The lockage of pleasure boats, skiffs, fishing boats and other small craft will be coordinated with the lockage of commercial craft. If no commercial craft are scheduled to be locked through within a reasonable time, not to exceed one hour after the arrival of the small craft at the lock, separate lockage will be made for such small craft.

(ii) Signals. Small boats desiring to use the lock will sound two long blasts followed by two short blasts of the horn. When the lock is ready for entrance, the lockmaster will notify the small boat by one long blast of the horn; or through the public address system. Permission to leave the lock will be given by the lockmaster by one short blast of the horn.

(10) Mooring in lock. All boats, when in the lock, shall be moored to the fastenings provided for that purpose, by bow and stern lines and other spring lines as may be necessary, and the lines shall not be let go until the signal is given by the lockmaster for the craft to leave the lock.

(11) Waiting for lockage. The mooring or anchoring of boats or other craft in the approaches to the lock, where such mooring will interfere with navigation of the lock is prohibited. All boats, barge tows and other craft to be passed through the lock shall lie in designated waiting areas in such manner as not to interfere with the navigation of the lock or its approaches, and, if a barge tow is to be divided into sections for locking, the section shall be brought into the lock as directed by the lockmaster. After passing through the lock, the sections shall be reassembled at such a distance from the entrance as not to obstruct or interfere with navigation of the lock or its approaches.

(12) Delay in lock. Boats or barges must not obstruct navigation by unnecessary delays in entering or leaving the lock.

(13) Damage to lock or other structures. The regulations contained in this paragraph shall not relieve the owners and operators of vessels from liability for any damage by their operations to the lock or other structures. They must use great care not to strike any part of the lock, any gate or appurtenance thereto, or machinery for operating the gates, or the walls protecting the banks of the approach canals. All boats with metal nosings or projecting irons, or rough surfaces that would be liable to damage the gates or lock walls, will not be permitted to enter the lock unless provided with suitable buffers and fenders.

(14) Tows. Tows shall be made up outside the canal entrance. All vessels engaged in towing other vessels not equipped with a rudder shall use two tow lines or a bridge and one tow line. If the vessel in tow is equipped with a rudder, one tow line may be used. All tow lines or hawsers must be hauled as short as practicable for safe handling of tows.

(15) Crew to move craft. The pilots in charge of tows and persons in charge of other craft must provide a sufficient number of men to handle lines in mooring craft and to move barges and other craft into and out of the lock easily and promptly.

(16) Handling valves, gates, bridges and machinery. No person, unless authorized by the lockmaster shall open or close any bridge, gate, valve or operate any machinery in connection with the lock; but the lockmaster may, under emergency conditions, call for assistance from the master of any boat using the lock, should such aid be necessary, and when rendering such assistance, the man so employed shall be strictly under the orders of the lockmaster.

(17) Landing of freight. No one shall land freight or baggage on or over the walls of the lock so as in any way to delay or interfere with navigation or the operation of the lock.

(18) Refuse in lock. No material of any kind shall be thrown or discharged into the lock, and no material of any kind shall be deposited into the lock area.

(19) Statistics. On each passage through the locks, as required by section 11 of the River and Harbor Act of September 22, 1922 (42 Stat. 1043; 33 U.S.C.A. 555) the master or clerk of any vessel or other craft shall furnish; upon prescribed forms provided for the purpose and obtainable at the locks, a statement of the passengers, freight and tonnage and such other statistical information as may be required by the forms.

(20) Persistent violation of regulations. If the owner or pilot of any boat persistently violates the regulations of this paragraph after due notice of the same, lockage may be refused by the lockmaster at the time of the violation or subsequent thereto, as required in the interest of public safety or protection of Government property.

(21) Other laws and regulations. In all other respects, the existing Federal laws, rules and regulations affecting navigable waters of the United States will govern in the use, administration and navigation of the ship channel, lock and its approaches.

§207.655 Rogue River, Oregon; logging. The dumping of logs into the Rogue River or upon its banks, below the high water line, and the rafting of logs, or floating of loose logs, sack rafts of timber and logs, and the towing of log rafts on Rogue River, is hereby limited to the period from 1 November of each year to 31 March of the following year (both dates inclusive). Parties engaged in logging operations on the Rogue River shall arrange their work so that the river shall be free from floating logs or debris caused by their operation from 1 April to 31 October of each year (both dates inclusive).

§207.660 Coquille River, Oreg.; logging on North Fork between its mouth and Gravel Ford, at the junction of the North and East Forks. During the 144 hours extending from midnight of each Wednesday to midnight of the following Tuesday loose timber and logs, and sack rafts (so called) of timber and logs, may be run, and parties engaged in this business may use the waterway in such reasonable manner as may be necessary for the proper transaction of such business: Provided, That during any other period than that designated above said parties shall so arrange their work as to leave the channel of said section of the river free from floating logs and timber and shall not obstruct or delay any other navigation interest.

§207.663 South Fork of Coos River, Oreg.; logging in tidal section. (a) During the months of August, September, and October loose timber and logs and sack rafts of timber and logs, hereinafter referred to as logs, may be floated in the tidal section of the South Fork of Coos River above the mouth of Bessie Creek, at the times and under the conditions hereinafter prescribed, on Monday only of each week: Provided, That if it is impracticable because of insufficient streamflow above the tidal section to float logs into the tidal section on any Monday, they may be floated in the tidal section, at the times and under the conditions hereinafter prescribed, on the first day between that Monday and the following Monday when the streamflow will permit.

(b) From November to July, both inclusive, logs may be floated in the tidal section of the South Fork of Coos River above the mouth of Bessie Creek, at the times and under the conditions prescribed in paragraphs (c) to (j) of this section on Tuesday and Friday only of each week.

(c) On any of the days designated in paragraphs (a) and (b) of this section when the floating of logs is permitted in tidal section above the mouth of Bessie Creek, they may be floated into the tidal section, at or near the head of tidewater, not more than two hours before the time of high tide at the point of entry, and be floated to the mouth of Bessie Creek: Provided, That such movement is handled expeditiously, and is entirely completed within five hours after the time of high tide at the point of entry.

(d) Two high tides normally occur each day. The high tide upon which logs may be floated into the tidal section above the mouth of Bessie Creek shall be the tide that reaches high slack at the point of entry nearest 12:00 o'clock meridian, Pacific standard time. The time of high tide at the head of the tidal section, for the purpose of this section, shall be considered as two hours and forty minutes after the predicted time of high tide at Humbolt Bay, California, the port of reference for Coos Bay, as published by the Coast and Geodetic Survey, Department of Commerce.

(e) In order that the river may be cleared in advance of an anticipated freshet, whenever the river stage above the tidal section rises more than two feet above the normal winter level as determined by the District Engineer, Corps of Engineers, in charge of the waterway, logs may be floated in the tidal section above the mouth of Bessie Creek.

(f) A single floating sheer boom shall be swung across the river above the mouth of Bessie Creek, at a location approved by the District Engineer, for the purpose of catching logs being floated as prescribed in paragraph (e) of this section: Provided, That such boom shall be in place only during the period in which the floating of logs is under way: Provided further, That at all times when such boom is swung across the river so as to obstruct or interfere with navigation a competent operator shall be in attendance who shall, upon the approach of any craft or tow desiring to pass either upstream or downstream, promptly swing the boom so as to clear the channel and allow such craft or tow to pass.

(g) A written or printed notice giving the day and hour at which time the floating of logs is contemplated in accordance with paragraphs (a) and (b) of this section shall be posted at least twenty-four hours prior thereto at such place at or near the mouth of the South Fork as shall be prescribed by the District Engineer, and shall also be attached to the warning flag pole provided for in paragraph (h) of this section.

(h) At all times between sunrise and sunset when logs are being moved in the tidal section above the mouth of Bessie Creek, and during a period of three hours before such movement is to begin, a red flag not less than three feet square shall be flown from a staff on the river bank near the mouth of Bessie Creek, so located that it can be plainly seen by operators of river craft proceeding upstream in that vicinity, and said flag shall not be flown at any time other than herein designated. Between sunset and sunrise a red light, instead of a red flag, shall be so displayed. After completion of each movement of logs the red signal shall be promptly removed.

(i) In that portion of the South Fork below the mouth of Bessie Creek, the floating of logs shall be prohibited at all times, and rafts shall not exceed 650 feet in length and 45 feet in width.

(j) This section shall not affect the liability of persons in charge of logging operations for any damages resulting therefrom.

§207.680 Willamette River, Oreg.; use, administration, and navigation of canal and locks at Willamette Falls, Oreg. (a) Administration–(1) Administrative jurisdiction. The canal and locks and all appurtenances shall be in charge of the District Engineer, Portland District, Corps of Engineers, Department of the Army, 628 Pittock Block, Portland, Oregon. The representative of the District Engineer at the locality shall be the lock master, who shall receive his orders and instructions from the District Engineer. In case of emergency, however, the lock master shall have authority to take such steps as may be immediately necessary without waiting for instruction from the District Engineer.

(2) Operational jurisdiction. The lock master shall be charged with the immediate control and management of the canal and locks and the grounds and public property pertaining thereto. He shall see that all laws, rules and regulations, for the use of the canal and grounds are duly complied with, to which end he is authorized to give all necessary orders and directions in accordance therewith, both to employees of the Government and to any and every person within the limits of the canal and locks or grounds pertaining thereto, whether navigating the canal or not. In case of the absence or disability of the lock master, his duty shall be performed by an assistant or other employee to be designated by the District Engineer.

(b) Use and navigation–(1) Authority of lock master. The lock master or his assistants shall direct the movement, operation, and moorage and all vessels, boats, rafts, barges, or other floating things using the locks, while they are in the locks, the canal basin, or in either the upstream or downstream lock approaches. Crews of vessels, boats, rafts, barges, or other floating things seeking lockage shall render such assistance as the lock master or his assistants may require.

(2) Signals. All vessels desiring lockage shall signal the same by one long and one short blast of the whistle, delivered at a distance of approximately 1,000 feet from the locks. Requests for lockage may also be made by telephoning or otherwise notifying the lock master's office. Notice to vessels desiring lockage will be given by red and green traffic lights. Vessels may enter locks on green lights, but must await green signal when lights are red. Permission to leave the lock will be given in the same manner. In the event a failure occurs and the referenced lights cannot be operated, the lock master will indicate by voice or by hand or lantern signals when vessels may enter or leave the locks.

(3) Controlling dimensions. For lockage purposes the maximum length of space available is 175 feet and the maximum clear width available is 37 feet. All vessels, boats, rafts, barges, or other floating things of less size than the foregoing dimensions can pass through the locks. The controlling water depth over the intermediate miter sills throughout the locks is 6.5 feet. However, the depth on the sill of the upstream gate at low water is 7.5 feet and over the downstream sill is 8.4 feet. The elevation of the upstream sill is 43.7 feet and of the downstream sill is −6.4 feet, corresponding to the elevations shown on the gages provided at both the downstream and upstream approaches to the locks. All vessels, boats, rafts, barges, and other floating things of which the dimensions or draft are greater than will permit clearing any of the above indicated elevations shall be prohibited from entering the locks. All vessels, boats, rafts, barges or other floating things entering the locks in violation of the above shall be responsible for all resulting damages.

(4) Precedence at locks. Ordinarily the vessel, boat, raft, barge, or other floating thing arriving first at the lock will be locked through first. In the event of a simultaneous approach from opposite directions ascending craft will ordinarily be locked through first. When several boats are to be passed through the locks, the order of precedence shall be as follows:

(i) To boats owned by the United States or employed upon river and harbor improvement work.

(ii) To passenger boats.

(iii) To freight and tow boats.

(iv) To rafts.

(v) To small vessels and pleasure craft. The lock master shall have authority to digress from the above precedence in order to eliminate reversing the flow of traffic through the locks when both upbound and downbound lockages are in waiting.

(5) Entrance to locks. The lock master shall decide whether one or more vessels may be locked through at the same time. No one shall attempt to enter the locks with a vessel or attempt to cause a vessel to enter the locks until he is authorized by the lock master to do so. No one shall take a vessel, or cause a vessel to be taken, within the limits of 500 feet above the upper gate and 300 feet below the lower gate, except for the purpose of entering the locks; and not for this purpose until it has been indicated to him by a proper person by signal that the lock is ready to receive the vessel. All vessels within the foregoing limits must be operated under "slow bell" and be kept constantly under control.

(6) Lockage of small boats. Pleasure boats, skiffs, fishing boats, and other small craft may be passed through the locks singularly, in groups, or as part of a lockage of other than pleasure craft. A continual flow of traffic in one direction will not be interrupted or reversed to accommodate these small pleasure boats. However, any such small boat will be accommodated at such time as the lock master upon receipt of a request for lockage deems such action will not interfere with other traffic. The decision of the lock master shall be final as to whether craft requesting lockage is defined as a pleasure boat.

(7) Use of canal and locks. No person, unless authorized by the lock master or his assistants, shall open or close any bridge, lock gate, wicket gate, or operate any lock machinery, or in any way interfere with any mechanism or appliance connected with the operation of the locks nor shall anyone interfere with the employees in the discharge of their duties. The lock master or his assistants may call for aid from the persons in charge of any craft, vessel, or raft using the lock, should such aid be necessary. Persons rendering such assistance shall be strictly under the orders of the lockmaster. The Government reserves the right to refuse lockage to any vessel, craft or raft when the persons in charge thereof refuse to give such assistance when it is requested. The persons in charge of vessels with tows or rafts, barges and other craft must provide sufficient personnel, lines and towing equipment of sufficient power to insure at all times full control of such tows, rafts, barges and other craft while moving into and through the locks, unless otherwise prearranged with the lock master. A copy of these regulations shall be kept at all times on board each vessel regularly engaged in navigating the locks. Copies may be obtained without charge from the lock master or from the District Engineer, Corps of Engineers, Department of the Army, 2850 SE. 82d Avenue, Post Office Box 2946, Portland, Oreg. 97208.

(8) Petroleum vessels. All tankers, barges, and other floating equipment, used for transporting inflammable liquids, either with or without cargo, shall be equipped with fixed timber fenders and, if not so equipped, shall have aboard an adequate number of suitable fenders of timber, rubber, or rope which are to be placed between the vessel and unfendered lock structures. All such barges or other vessels navigating without power within the canal or locks must be assisted by one or more tugs of sufficient power to insure full control at all times whether passing upstream or downstream through the locks with or without cargo.

(9) Mooring in locks. All boats, barges, rafts, and other craft when in the locks shall be moored by head and spring lines and such other lines as may be necessary to the fastenings provided for

that purpose; and the line shall not be unloosed until the signal is given for the vessel to leave the lock.

(10) Mooring while waiting for lockage. The mooring of boats, tows or other craft in the approaches to the locks where such mooring will interfere with navigation or other vessels to or from the locks is prohibited.

(11) Delays. Boats, barges, rafts, or other craft must not obstruct navigation by unnecessary delay in entering or leaving the locks. Vessels failing to enter the locks with reasonable promptness, when signaled to do so, and vessels arriving at the locks with their tows in such shape so as to impede lockage shall forfeit their turn.

(12) Landing of freight. No freight or baggage shall be unloaded on or over the walls of the canal or locks. Freight and baggage consigned to the Willamette Falls locks shall be unloaded only at such places as may be provided for this purpose or as directed by the lock master.

(13) Refuse in canal or locks. No refuse or other material shall be thrown or dumped from vessels into the canal and locks, or deposited in the lock area, or placed on the berm of the canal so that it is liable to be thrown or washed into the waterway. Violations of this paragraph (b)(13) shall be subject to sections 13 and 16 of the River and Harbor Act of March 3, 1899 (33 U.S.C. 407, 411).

(14) Damage to locks or other structures. The regulations contained in this section shall not affect the liability of the owners and operators of vessels for any damage caused by their operations to the locks or other structures. Persons in charge of vessels and log rafts passing through the locks must use great care to prevent the vessels or log rafts from striking any gate or appurtenance thereto. All boats or barges with metal nosings, or projecting irons, or rough surfaces, and log rafts with dragging cables that may damage any part of the lock structures will not be permitted to enter the locks unless said craft are provided with suitable protective buffers and fenders and log rafts are free of loose, dragging cables.

(c) Statistics. Masters or pursers of vessels shall, upon each passage through the locks or upon each passage to an intermediate point of terminus within the locks system, furnish the lock master with information concerning the number of passengers, the amount of freight, the net registered tonnage and such other statistics as may be required on the prescribed forms which shall be furnished by the lock master for this purpose. Failure to furnish such information shall be construed as sufficient cause to refuse the offending vessel passage through the locks.

(d) Trespass. No one shall trespass on the grounds or buildings, and everyone shall be deemed guilty of trespass within the meaning of this paragraph who shall willfully or carelessly damage or disfigure the canal and locks or any part thereof, or any building or appliance on the grounds, or who shall carry on business or trading of any sort, or shall build any fishing stand or lead, or set any fish net within the limits of the reservation, or do any act to or on the grounds or buildings which would be recognized by law as a trespass.

(e) Definitions. Except as otherwise provided in paragraph (b)(6) of this section, whenever such a word as "vessel", "boat", "barge", "raft", or the like is used in this section, it shall include all types of floating things which may be subject to lockage. Failure to refer specifically to a type of floating thing by its name shall not mean exclusion thereof from applicability of this section.

§207.718 Navigation locks and approach channels, Columbia and Snake Rivers, Oreg. and Wash. (a) General. All locks, approach channels, and all lock appurtenances, shall be under the jurisdiction of the District Engineer, Corps of Engineers, U.S. Army, in charge of the locality. His representative at the locks shall be the Project Engineer, who shall issue orders and instructions to the Lock Master in charge of the lock. Hereinafter, the term "Lock Master" shall be used to designate the person in immediate charge of the lock at any given time. In case of emergency and on all routine work in connection with the operation of the lock, the Lock Master shall have authority to take action without waiting for instructions from the Project Engineer.

(b) Lockage Control. The Lock Master shall be charged with immediate control and management of the lock, and of the area set aside as the lock area, including the lock approach channels. Upstream and downstream approach channels extend to the end of the wing or the guide wall, whichever is longer. At Bonneville lock the upstream approach channel extends to the upstream end of Bradford Island and the downstream approach channel extends to the downstream end of the lower moorage. The Lock Master shall demand compliance with all laws, rules and regulations for the use of the lock and lock area and is authorized to issue necessary orders and directions, both to employees of the Government or to other persons within the limits of the lock or lock area, whether navigating the lock or not. Use of lock facilities is contingent upon compliance with regulations, Lock Master instructions, and the safety of people and property.

(c) Authority of Lock Master. No one shall initiate any movement of any vessel in the lock or approaches except by or under the direction of the Lock Master. ("Vessel" as used herein includes all connected units, tugs, barges, tows, boats or other floating objects.)

(d) Signals–(1) Radio. All locks are equipped with two-way FM radio operating on channel 14, frequency of 156.700 MHz, for both the calling channel and the working channel. Vessels equipped with two-way radio desiring a lockage shall call WUJ 33 Bonneville, WUJ 34 The Dalles, WUJ 35 John Day, WUJ 41 McNary, WUJ 42 Ice Harbor, WUJ 43 Lower Monumental, WUJ 44 Little Goose, or WUJ 45 Lower Granite, at least one-half hour in advance of arrival since the Lock Master is not in constant attendance of the locks. Channel 14 shall be monitored constantly in the vessel pilot house from the time the vessel enters the approach channel until its completion of exit. Prior to entering the lock chamber, the commercial freight or log-tow vessel operator shall report the nature of any cargo, the maximum length, width and draft of the vessel and whether the vessel is in any way hazardous because of its condition or the cargo it carries or has carried.

(2) Pull-cord signal stations. Pull-cord signal stations marked by large instructional signs and located near the end of the upstream and downstream lock entrance walls may be used in place of radios to signal the Lock Master for a lockage.

(3) Entering and exit signals. Signal lights are located outside each lock gate. When the green (go) light is on, all vessels will enter in the sequence prescribed by the Lock Master except at Bonneville where freight and log-tow vessels only will enter on the amber light. When the red (stop) light is on, the lock is not ready for entrance and vessels shall stand clear. In addition to the above visual signals, the Lock Master will signal that the lock is ready for entrance by sounding one long blast on the lock air horn. The Lock Master will signal that the lock is ready for exit by lighting the green exit light and sounding one short blast on the air horn.

(4) Craft lockage-readiness signal. Upon query from Lock Master, a vessel operator will signal when he is properly moored and ready for the lockage to begin.

(e) Permissible dimensions of vessels. Nominal overall dimensions of vessels allowed in the lock chamber are 84 feet wide and 650 feet long, except at Bonneville where these dimensions are 74 feet wide and 500 feet long. Depth of water in the lock depends upon river levels which may vary from day to day. Staff gauges showing the minimum water level depth over gate sills are located inside the lock chamber near each lock gate and outside the lock chamber near the end of both upstream and downstream guide walls. Vessels which do not have a draft of at least one foot less than a guage reading shall not pass that gauge. Information concerning allowable draft for vessel passage through the locks may be obtained from the Lock Master. Minimum lock chamber water level depth is 15 feet except at Ice Harbor where it is 14 feet and at Bonneville where it is 24.2 feet. When the river flow at Lower Granite exceeds 330,000 cubic feet per second the normal minimum 15-foot depth may be decreased to as little as eight feet. At Bonneville, a tow may be rearranged to less than clear lock dimensions (74 feet by 500 feet) prior to entering the lock, and be passed in one lockage. Such rearrangements at Bonneville may be done at the moorage in the downstream lock approach channel or above the upstream guide wall and with the Lock Master's permission at the upstream guide wall. In consideration of river and swing bridge traffic at Bonneville the Lock Master may authorize rearrangement of vessels within the lock chamber only when both miter gates at the open end of the lock are in their recesses in the lock walls and rearrangement will not be hazardous to them. Vessels wider than 50 feet will not be permitted to enter the Bonneville Lock during extreme high water when tailwater at the lock is higher than 35 feet above m.s.l. since the downstream guide wall will be inundated.

(f) Precedence at Lock. Ordinarily, the vessel or tow arriving first at the lock will be locked through first; however, depending upon whether the lock is full or empty this precedence may be modified at the discretion of the Lock Master. When several vessels are waiting for a lockage, precedence shall be given as follows:

First: Vessels owned or operated by the United States whose mission requires immediate passage.

Second: Commercial freight and log-tow vessels.

Third: All other vessels.

(g) Loss of turn. Vessels that fail to enter the lock with reasonable promptness, after being authorized to do so, shall lose their turn.

(h) Lockage.-(1) Multiple lockage. The Lock Master shall decide whether one or more vessels or tows may be locked through at the same time. Vessels with flammable or highly hazardous cargo will be passed separately from all other vessels. Hazardous materials are described in 49 CFR 171. Flammable materials are defined in the National Fire Code of the National Fire Protection Association.

(2) Small Craft. At the discretion of the Lock Master, the lockage of pleasure, fishing, and other small vessels may be coordinated with the lockage of commercial vessels. If no commercial craft is scheduled to be locked through within a reasonable time, not to exceed one (1) hour after arrival of the small craft at the lock, separate lockage will be made for such small craft.

(i) Mooring in approaches prohibited. Mooring or anchoring in the approaches to the lock is prohibited where such mooring will interfere with navigation.

(j) Waiting for Lockage. Vessels waiting for lockage shall wait in the clear outside of the lock approach channel, or contingent upon permission by the Lock Master, may at their own risk, lie inside the approach channel at a place specified by the Lock Master. At Bonneville, vessels may at their own risk, lay-to at the downstream moorage facility on the south shore downstream from the guide wall: Provided, That a 100-foot-wide open channel is maintained and vessels upstream may lay-to against the guide wall, at their own risk, provided they remain not less than 400 feet upstream of the upstream lock gate; or contingent upon prior radio clearance by the Lock Master they may, at their own risk, tie to the upstream guide wall.

(k) Mooring in lock. All vessels must be moored within the lock chamber so that no portion of any vessel extends beyond the lines painted on the lock walls. Moorage within the lock chamber will be to floating mooring bits only and will be accomplished in a proper no-slip manner. Small vessels will not be locked with a large vessel unless the large vessel is so moored (two mooring bits) that no lateral movement is possible. The vessel operator will constantly monitor the position of his vessel and his mooring bit ties to assure that there is no fore or aft movement of his vessel and lateral movement is minimized. Propulsion by vessels within the lock chamber will not be permitted during closure operation of a lock chamber gate or as otherwise directed by the Lock Master.

(l) Crew to move craft. During the entire lockage, the vessel operator shall constantly attend the wheelhouse, be aware of the vessel's position, and monitor radio channel 14 on frequency 156.700 MHz, or otherwise be constantly able to communicate with the Lock Master. At a minimum, vessels shall be as vigilantly manned as if underway.

(m) Speed. Vessels shall be adequately powered to maintain a safe speed and be under control at all times. Vessels shall not be raced or crowded alongside another in the approach channels. When entering the lock, speed shall be reduced to a minimum consistent with safe navigation. As a general rule, when a number of vessels are entering the lock, the following vessel shall remain at least 200 feet astern of the vessel ahead.

(n) Delay in lock. Vessels shall not unnecessarily delay any operation of the locks.

(o) Landing of freight. No freight, baggage, personnel, or passengers shall be landed on or over the walls of the lock, except by permission and direction of the Lock Master.

(p) Damage to lock or other structures. The regulations in this section shall not relieve owners and/or operators of vessels from liability for any damage to the lock or other structures or for the immediate removal of any obstruction. No vessel in less than stable floating condition or having unusual sinking potential shall enter the locks or its approaches. Vessels must use great care not to strike any part of the lock, any gate or appurtenance thereto, or machinery for operating the gates, or the walls protecting the banks of the approach channels. All vessels with projecting irons, or rough surfaces which may damage the gates or lock walls, shall not enter the lock unless provided with suitable buffers and fenders. Vessels having chains, lines, or drags either hanging over the sides or ends or dragging on the bottom for steering or other purposes will not be permitted to pass.

(q) Tows. Prior to a lockage, the person in charge of a vessel towing a second vessel by lines shall, at a safe distance outside of the incoming approach channel, secure the second vessel to the towing vessel and keep it secured during the entire course of a lockage and until safely clear of the outgoing approach channel.

(r) Violation of regulations. Any violation of these regulations may subject the owner or master of any vessel to any or all of the following: (1) Penalties prescribed by law of the United States Government (33 U.S.C. 1); (2) Report of violation to the titled owner of the vessel; (3) Report of violation to the U.S. Coast Guard; (4) Refusal of lockage at the time of violation.

(s) Refuse in locks. No material of any kind shall be thrown or discharged into the lock, or be deposited in the lock area. Vessels leaking or spilling cargo will be refused lockage and suitable reports will be made to the U.S. Coast Guard. Deck cargo will be so positioned so as not to be subject to falling overboard.

(t) Handling valves, gates, bridges, and machinery. No person, unless authorized by the Lock Master, shall open or close any bridge, gate, valve, or operate any machinery in connection with the lock. However, the Lock Master may call for assistance from the master of any vessel using the lock, should such aid be necessary; and when rendering such assistance, the person so employed shall be directly under the orders of the Lock Master. Masters of vessels refusing to provide such assistance when it is requested of them may be denied the use of the lock by the Lock Master.

(u) Statistics. On each passage through the lock, masters or pursers of vessels shall furnish to the Lock Master, a written statement of passengers, freight, and other information as indicated on forms furnished boat operators by the Lock Master.

(v) Hazardous areas. At McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams, all water from the downstream face of the dam to a line straight across the river at the downstream end of the downstream lock guide wall is considered hazardous and vessels may enter only at their own risk.

(w) Restricted areas. No vessel shall enter or remain in any restricted area at any time without first obtaining permission from the District Engineer, Corps of Engineers, U.S. Army, or his duly authorized representative.

(1) At Bonneville Dam. The waters restricted to only Government vessels are described as all waters of the Columbia River and Bradford Slouth within 1,000 feet above and 2,000 feet below the powerhouse. The restricted areas will be designated by signs.

(2) At the Dalles Dam. The waters restricted to only Government vessels are described as all downstream waters other than those of the navigation lock downstream approach channel which lie between the Wasco County Bridge and the project axis including those waters between the powerhouse and the Oregon shore and all upstream waters other than those of the navigation lock upstream approach channel which lie between the project axis and a line projected from the upstream end of the navigation lock guide wall to the junction of the concrete structure with the earth fill section of the dam near the upstream end of the powerhouse.

(3) At the John Day Dam. The waters restricted to only Government vessels are described as all of the waters within a distance of about 1,000 yards above the dam lying south of the navigation channel leading to the lock and bounded by a line

commencing at the upstream end of the guide wall, and running in a direction 54°01'37" true for a distance of 771 yards, thence 144°01'37" true across the river to the south shoreline. The downstream limit is marked by orange and white striped monuments on the north and south shores.

(4) At McNary Dam. The waters restricted to only Government vessels are described as all waters within a distance of about 1,000 yards above the dam lying south of the guide wall and bounded by a line commencing at the upstream end of the guide wall and running in a direction 93°30' true for a distance of 495 yards, thence 175°15' true for 707 yards, thence 179°00' true for 441 yards, thence 235°00' true for 585 yards, thence 268°00' true for 146 yards to the head of the fish ladder.

(5) At Ice Harbor Dam. The waters restricted to only Government vessels are described as the waters within a distance of about 800 yards upstream of the dam lying south of the navigation channel leading to the lock and bounded by a line commencing at the upstream end of the guide wall, and running a direction 83°00' true for a distance of 600 yards, thence 175°00' true for a distance of 250 yards, thence 241°00' true to the upstream face of the dam.

(6) At Lower Monumental Dam. The waters restricted to only Government vessels are described as the waters within a distance of about 1,200 yards upstream of the dam lying north of the navigation channel leading to the lock and bounded by a line commencing at the upstream end of the fixed guide wall and running in a direction 48°00' true for a distance of 340 yards, thence 326°00' true for a distance of 366 yards, thence 260°00' true for a distance of 160 yards, thence 270°00' true to the north shore.

(7) At Little Goose Dam. The waters restricted to only Government vessels are described as those within a distance of 800 yards above the dam lying north of the guide wall and bounded by a line commencing at the upstream end of the guide wall and running in a direction 64°13' true for a distance of 567 yards, thence 349°03' true for a distance of 610 yards to the north shoreline.

(8) At Lower Granite Dam. The waters restricted to only Government vessels are described as those within a distance of 800 yards above the dam lying south of the guide wall and bounded by a line commencing at the upstream end of the guide wall and running in a direction 136° true for a distance of 586 yards ±, thence 214° true for a distance of 250 yards to the south shoreline.

Drawings which depict the hazardous and restricted areas in paragraphs (v) and (w) of this section are available from the District Engineers for areas within their respective jurisdictions.

§207.720 Willapa Bay and tributaries, Wash.; logging. (a) The floating of loose logs, or sack rafts of timber and logs, is prohibited in Willapa Bay and at or below points on tributary streams as specified in the following list:

North Fork of Willapa River, below Willapa city.

South Fork of Willapa River, below a point 1 mile above the Northern Pacific Railway bridge.

North River, below the lower end of McGowan's boom, about 1 mile above mouth.

Smith Creek, at its mouth.

Querquellin River, at its mouth.

Palix River, at its mouth.

North Nemah River, below the boom of the Nemah River Logging Co., about 1 mile above mouth.

South Nemah River, at its mouth.

Nasel River, below Nasel boom, about 3 miles above mouth.

Bear River, below new county bridge, about 3 miles above mouth.

(b) Hemlock logs that will not float with at least 6 inches of butt out of water shall not be floated in any of the streams tributary of Willapa Bay, and no boat shall tow any raft containing any log of this character, unless such log is securely fastened so as to prevent its escape from the raft.

§207.730 Grays Harbor and tributaries, Wash.; logging. (a) Before operating on Grays Harbor or tributary streams all loggers, river drivers, log towboats, and log towboat companies shall register at the United States Engineer Office, Seattle, Wash., giving the firm name, name of manager, and post office address. They shall also register annually thereafter on July 1 of each year.

(b) No logs shall be dumped into the rivers or released from storage or sorting booms without being turned over to a registered driving or towboat company, firm, or individual.

(c) River drivers authorized to operate on the streams tributary to Grays Harbor must maintain a sufficient organization of boats and experienced workmen to care for the drivers of their customers.

(d) River drivers shall so conduct their operations that all parts of the rivers upon which they operate will be effectively patrolled and the formation of jams prevented.

(e) Should a blockade of logs occur below the head of tidewater in any of the rivers at any time, each logger operating on the river above the location of said blockage shall discontinue dumping logs into the river until the blockage shall be broken.

(f) Log drivers must not indifferently operate or delay the transit of logs.

(g) Loggers who entrust their logs to river drivers will be required to satisfy themselves that their logs are being driven in accordance with this section.

(h) The floating of loose logs or of sack rafts of timber and logs is prohibited in the Chehalis River below Preachers Slough; in the Hoquiam River below the forks; and also in the Wishkah River below a point 4 miles above the mouth.

(i) The floating of rafts or tows of timber and logs which exceed 700 feet in length and 60 feet in width is prohibited in the Chehalis River between the Oregon-Washington Railroad Co. bridge at Aberdeen and the Northern Pacific Railroad Co. bridge at Cosmopolis, and also in the Hoquiam

River below the forks; and the floating of rafts or tows of timber and logs which exceed 700 feet in length and 55 feet in width is prohibited in the Wishkah River below the North Aberdeen Bridge.

(j) Hemlock logs that will not float with at least 6 inches of butt out of water shall not be floated in any of the streams tributary to Grays Harbor, and no boat shall tow any raft containing any log of this character unless such log is securely fastened so as to prevent its escape from the raft.

§207.750 Puget Sound Area, Wash. (a) Strait of Juan de Fuca, eastern end; off the westerly shore of Whidbey Island; naval restricted areas–(1) Area No. 1. Bounded by a line commencing at latitude 48°20′57″N., longitude 122°40′39″W.; thence to latitude 48°20′40″N., longitude 122°42′59″W.; thence to latitude 48°21′19″N., longitude 122°43′02″W.; thence to latitude 48°21′13″N., longitude 122°40′26″W.; and thence along the shore line to the point of beginning.

(2) Area No. 2. Bounded by a line commencing at latitude 48°21′53″N.; longitude 122°40′00″W.; thence to latitude 48°23′12″N., longitude 122°41′17″W.; thence to latitude 48°23′29″N., longitude 122°40′22″W.; thence to latitude 48°22′21″N., longitude 122°39′50″W.; and thence along the shore line to the point of beginning.

(3) The regulations. (i) Vessels shall not enter these areas except at their own risk.

(ii) All vessels entering these areas shall be obliged to comply with orders received from naval sources pertaining to their movements while in the areas.

(iii) The regulations in this paragraph shall be enforced by the Commandant, 13th Naval District, or his authorized representative.

(b) (Reserved)

(c) Admiralty Inlet, entrance; naval restricted area–(1) The area. Beginning at Point Wilson Light thence southwesterly along the coast line to latitude 48°07′N.; thence northwesterly to a point at latitude 48°15′N. longitude 123°00′W.; thence due east to Whidbey Island; thence southerly along the coast line to latitude 48°12.5′N.; thence southerly to the point of beginning.

(2) The regulations. (i) Use of any equipment such as anchors, fishing gear, grapnels, etc., which may foul underwater installations within the restricted area, is prohibited. Dumping of any nonbuoyant objects in this area is prohibited.

(ii) The regulations of this paragraph shall be enforced by the Commandant, Thirteenth Naval District, or his duly appointed representative.

(d) (1)–(6) (Reserved)

(7) Statistics. At the end of each month masters or clerks of vessels or boats that have used the canal during the month shall report to the District Engineer, U.S. Army Engineer District, Seattle, upon prescribed forms, a statement of passengers, freight, and registered tonnage, and such other statistical information as may be required by the blank forms which are issued to them for that purpose.

(8) Trading, landing, etc. No business, loading, or landing of freight or baggage will be allowed on or over the canal piers or bulkheads.

(9) Refuse. No person shall throw material of any kind into the canal.

(10) (Reserved)

(11) Obstructions. On the canal's being obstructed by a vessel, raft, or other craft, by sinking, grounding, or otherwise, the District Engineer, Seattle, shall be notified by telephone or telegraph as soon as possible by the person in charge of the obstructing vessel, raft, or craft.

(e) Hood Canal, Bangor, Naval Restricted Areas-(1) Area No. 1. That area bounded by a line commencing on the east shore of Hood Canal at latitude 47°43′28″N.; thence 270° true to latitude 47°43′28″N., longitude 122°44′40″W.; thence to latitude 47°43′50″N., longitude 122°44′40″W.; thence to latitude 47°44′24″N., longitude 122°44′22″W.; thence to latitude 47°45′47″N., longitude 122°43′22″W.; thence to latitude 47°46′23″N., longitude 122°42′42″W.; thence to latitude 47°46′23″N., longitude 122°42′20″W.; thence 125° true to the high tide line; thence southerly along the shoreline to the point of beginning.

(2) Area No. 2. Waters of Hood Canal within a circle of 1,000 yards diameter centered on a point located at latitude 47°46′26″N., longitude 122°42′49″W.

(3) The Regulations-(i) Area No. 1. No vessel shall enter this area without permission of the Commandant, Thirteenth Naval District, or his/her authorized representative.

(ii) Area No. 2 (A) The area will be used intermittently by the Navy for magnetic silencing operations.

(B) Use of any equipment such as anchors, grapnels, etc., which may foul underwater installations within the restricted area, is prohibited at all times.

(C) Dumping of any nonbuoyant objects in this area is prohibited.

(D) Navigation will be permitted within that portion of this circular area, not lying within Area No. 1 at all times except when magnetic silencing operations are in progress.

(E) When magnetic silencing operations are in progress, use of the area will be indicated by display of quick flashing red beacons on the pier located in the southeast quadrant of the area.

(F) The regulations in this paragraph shall be enforced by the Commandant, Thirteenth Naval District, or his/her authorized representative.

(f) (Reserved)

(g) Lake Washington Ship Canal; use, administration, and navigation–(1) Definitions. The term "canal" as used in the regulations in this paragraph shall include the water area in the locks and the channel and adjacent waters from a point 5,500 feet northwest of the Burlington Northern, Inc. railway bridge to the east end of the channel opposite Webster Point, Lake Washington. The term "canal grounds" shall include all grounds set aside for the use of the canal or occupied in its construction.

(2) Supervision. The canal and all its appurtenances shall be under the supervision of the Dis-

trict Engineer, Corps of Engineers, Seattle. The District Engineer will detail as many assistants as may be necessary for the efficient operation of the canal and the enforcement of the regulations in this paragraph. The movement of all vessels and other floating things in the canal and approaches thereto shall be under the direction of the District Engineer and his authorized assistants. All orders given under the regulations to any master or person in charge of any vessel, raft, or other watercraft by the District Engineer or his authorized assistants, either in person or through any canal operative, shall be acknowledged and obeyed. Failure to see, understand, or comply with signals or instructions shall constitute a violation of the regulations. Any person refusing to comply with the regulations or any orders given in pursuance thereof may be denied the privileges of the canal or canal grounds.

(3) Speed. To avoid damage to other vessels and to property along the shores, all vessels shall proceed at reduced speed in the canal as follows:

(i) From the west entrance of the Lake Washington Ship Canal to the western end of the west guide pier of the Hiram M. Chittenden Locks, and from the east end of the easternmost guide pier of said Locks to the white flashing dolphin located south of Webster Point on Lake Washington, including all of Salmon Bay, Lake Union, Portage Bay, and Union Bay, it shall be unlawful for any person to operate any watercraft or vessel at a speed in excess of 7 nautical miles per hour within 200 feet of any shoreline, pier, restricted area or shore installation.

(ii) From the western end of the aforesaid west guide pier to the eastern end of the aforesaid east guide pier at said Locks, it shall be unlawful for any person to operate any watercraft or vessel at a speed in excess of 4 nautical miles per hour.

NOTE. Signs are located along the canal to indicate permissible speeds.

(4) Traffic signal lights. In addition to the lock signal lights described in paragraph (g)(5)(ii) of this section, a red light, and a green light are installed on the west side of the Ballard Bridge, on the east side of the Fremont Bridge, 1,000 feet west of the Montlake Bridge, and 1,000 feet east of the Montlake Bridge, for the guidance of vessels approaching the sections of the canal between Salmon Bay and Lake Union and between Lake Union and Lake Washington, respectively. Vessels of 300 gross tons and over and all vessels with tows, except as hereinafter provided, shall not pass the red lights. The green lights will indicate that vessels may proceed. Vessels of less than 300 gross tons without tows may disregard these signals, but they shall travel at very slow speed when passing other vessels. Vessels of 300 gross tons and over and vessels with tows, except logs, whose destination is easterly between the Ballard Bridge and a point 2,500 feet east of the Ballard Bridge, may pass the red signals on the Ballard Bridge, provided, such passage will not interfere with approaching traffic.

(5) Approaching and passing through locks–

(i) Signals for locks. Vessels with tows desiring to use the locks shall so indicate by two long and three short blasts of a whistle, horn or megaphone. All other vessels desiring to use the locks shall so indicate by two long and two short blasts. NOTE: The term "long blasts" means blasts of four seconds duration, and the term "short blasts" means blasts of one second duration. Signals for the opening of drawbridges are prescribed in §117.795 of this chapter.

(ii) Lock signal lights. Red and green signal lights are installed on the guide pier west of the Burlington Northern, Inc. railway bridge below the locks. The green light will indicate to vessels bound for the large lock that the lock has been made ready. If the red light is burning, vessels bound for the large lock shall moor at the pier. Vessels bound for the small lock shall be guided into the small lock by traffic signals thereon. The masters of all vessels approaching the locks from Puget Sound shall be alert to receive and shall immediately comply with instructions by voice or signal from the employee on the west pier.

(iii) Precedence at locks. All vessels approaching the locks shall stop at the points indicated by signs placed on the canal piers or as directed by a lockman until ordered to proceed into the lock. Unless otherwise directed by the District Engineer or his authorized assistants, vessels owned or operated by the United States or the City of Seattle and passenger vessels operating on a regular schedule shall have precedence over all others in passing through the locks. Registered merchant vessels shall have precedence over pleasure craft, which shall pass through in the order of their arrival at the locks, and both shall have precedence over vessels towing floated timber or logs. Tows of floated timber and logs may be denied the use of the locks during certain hours when both locks are busy passing other traffic. However, advance notice will be given towboat companies as to the periods when log tows will be denied lockage.

(iv) Entering locks. Masters of vessels shall exercise the greatest care when entering either lock. The forward movement of vessels while taking position in the locks shall be very slow, and boats entering the small lock shall reduce their speed to not more than two and one-half miles per hour when within 200 feet of the outer gate and come to practically a full stop before entering the lock so that in case the engine mechanism fails to operate properly the momentum of the boat may be stopped easily by its lines. The masters of vessels entering either lock from either direction shall be alert to receive and shall immediately comply with instructions by voice or signal from the lock attendants.

(v) Mooring in locks. Vessels entering the locks shall be equipped with adequate lines, at least 50 feet in length being required fore and aft. While in the large lock vessels and rafts will be moored at the top of the lock wall. While in the small lock vessels shall be moored to the floating mooring wall. Lines shall not be released until the signal has been given by the lock force to leave the lock, after which there shall be no delay in leaving. All vessels not equipped to handle tie-up lines with power winches shall be equipped with suitable mooring lines of manila, or other suitable fiber, of sufficient size and strength to hold the vessel against the currents to be met within the lock chamber. The use of wire rope for tie-up by vessels not equipped to handle such lines with power winches is prohibited. Vessels may be denied the use of the locks if their lines are not in good condition, or if the mooring bits on barges are not accessible or are not equipped to prevent lines from slipping off when the water is lowered in the lock. All vessels entering the locks should have, in addition to the master, at least one person on deck to handle lines. Mates and deckhands, when preparing to moor within the lock chambers, should not throw heavy mooring lines at the lockmen on the walls, but should wait for a heaving line to be passed to them unless otherwise directed. All towboat crews, while locking or moving a tow out of the lock chamber, should station themselves so as to preclude the possibility of being injured by the parting of cable or lines under strain. Persons attempting to take vessels through the locks without assistance on deck may be required to wait until the lock is clear of other traffic before passing through. All operators of vessels are especially cautioned to use extreme care while crowded in the locks to avoid accident or fire on their boats. Under no circumstances will small craft, such as rowboats, launches and houseboats, or any other type of pleasure boats, be locked through with barges used for carrying any type of petroleum product or other hazardous material. At the discretion of the lockmaster, small craft as described above may be locked through with barge tows containing other than dangerous material. Operators of small vessels and larger vessels operating in the proximity of each other shall be alert to the danger arising from the limited maneuverability of the larger vessels, and shall exercise all precautions to prevent accident.

(6) Damage to locks or other structures.

(i) The regulations in this paragraph shall not affect the liability of the owners and operators of vessels for any damage caused by their operations to the locks or other structures. The sides and corners of all vessels and rafts passing through the locks should be free from spikes or projections of any kind which might damage the locks or other structures. Vessels with appurtenances or projections which might damage the locks or other structures shall be fitted with adequate fenders. Lockage of leaking vessels or vessels with overhanging loads may be refused. Such barge or craft shall be moored in a location outside of the channel approach to the lock so as to not interfere with passing navigation. Vessels of unusual dimensions, or other characteristics which, in the opinion of the lockmaster, pose a threat to the integrity or safety of the locks or canal will be refused passage until written permission to pass is provided by the District Engineer. Sufficient written data and drawings shall be provided the District Engineer that an engineering determination can be made as to the safety of the vessel. The District Engineer shall have the right to inspect any such vessels prior to passage. The operators of all vessels shall use care to avoid striking the guide walls or other structures pertaining to the canal.

(ii) In the interest of safety and fire prevention, all woven rope fenders used with barges carrying flammable cargo should be water-soaked or otherwise fireproofed prior to entering the lock approaches.

(iii) Burning fenders should be dropped overboard immediately rather than being placed on the deck of a barge or towboat.

(iv) A minimum of one man with a portable fender shall be stationed at the head end of every tow of hazardous cargo and at the aft end if the lockmaster so directs so as to protect the lock and guide walls from damage while entering or departing the lock structures.

(v) All cylinders or containers holding gases under pressure, or any other chemical or substance, shall be securely fastened to the hull of the vessel to prevent their rolling overboard into the lock chamber and becoming a hazard.

(vi) All containers holding paint, gasoline or other volatile materials shall be securely fastened with tight-fitting covers. To preclude a concentration of potentially explosive vapors, no paint will be allowed to be applied to the exterior of vessel hulls, houses, machinery or other equipment while the vessels are in the lock chamber.

(vii) All hatches of tank barges must be closed prior to entering lock. Tank barges with open hatch or hatches will be denied lockage.

(viii) No smoking will be permitted aboard vessels with cargoes of fuel or explosives.

(ix) All vessels carrying hazardous cargoes shall so be identified with the lockmaster. They shall be in compliance with Department of Transportation (U.S. Coast Guard) regulations (46 CFR 30-40, 146-154 and 49 CFR 171-179) and shall accordingly carry required markings. All DOT safety regulations for transit of hazardous cargoes shall be adhered to, whether or not specifically cited or duplicated herein.

(7) Commercial statistics.

(i) On each passage through the locks, as required by section 11 of the River and Harbor Act of September 22, 1922 (42 Stat. 1043: 33 U.S.C. 555), the master or clerk of any vessel or other craft other than pleasure vessel shall furnish, upon prescribed forms provided for the purpose and obtainable at the locks, a statement of the passengers, freight, and tonnage, and such other statistical information as may be required by the forms. The total cargo carried must be reported showing separately the tonnage in transit, and the tonnage, kind, and destination of cargo to be unloaded.

(ii) Reports of log rafts passing through the canal shall show the number of sections in the lock at each passage and, in the case of boom sticks, poles, or piles, the number of sticks in the tow. For logs, poles, or piles in cribs or in built-up rafts of more than one layer, the report shall show the total board feet in the raft.

(iii) Except by special permit, no vessel other than pleasure craft will be allowed to pass through the lock until a correct statement is furnished of the passengers, freight, and tonnage, and such other statistical information as may be required by the prescribed forms provided for the purpose.

(8) Rafts. (i) No log raft exceeding 700 feet in length or 76 feet in width shall pass through the canal. Boom sticks shall be smooth, with rounded ends, and securely tied together with cables, chains, or log swifters to prevent the raft from spreading while in the lock. Rafts containing logs that do not float above water for their entire length, or are in danger of being submerged when they enter fresh water, shall not be towed in the canal until such logs are securely fastened so as to prevent their escape from the raft.

(ii) Whenever required, log rafts passing in through the lock will be given a number that shall be fastened on one of the logs in the raft. This number will identify the raft and shall not be removed until the logs are used.

(iii) Two floats are maintained in Shilshole Bay near the entrance of the canal channel to facilitate the handling of logs in the canal. Rafts bound for the canal may be moored at one of these floats, only the portion of the raft that is to be taken through at a single lockage being brought into the canal. The remainder of the raft may be left at the float until the first portion has been towed to its destination above the lock.

(9) Tows. All vessels engaged in towing shall use tow lines of the least practicable length and shall have full control of their tows at all times. Towing more than one craft abreast is forbidden if the total width of the tow, including the towboat, exceeds 70 feet.

(10) Obstructing navigation. (i) All vessels and tows passing through the canal shall be kept as close as practicable to the center or, when safer, to the right side of the waterway, except when passing other craft or preparing to moor at a pier or wharf. Slowly moving log rafts, tows, or vessels shall, whenever practicable, pull out of the way when meeting other vessels or when other traffic proceeding in the same direction desires to pass. Vessels are forbidden to obstruct the canal in any way or to delay by slow passage through the canal the progress of other vessels. Small and readily maneuverable vessels operating in the vicinity of larger, less maneuverable vessels shall, in all cases, keep clear and operate with caution in order that the large vessels may maintain safe steerage way and that hazards to all vessels may be reduced. All vessels shall operate with extreme caution and movements shall be made only when adequate precautions for the safety of other vessels and property are being effectively employed.

(ii) The placing of logs, vessels, or other floating objects within the limits of the dredged channels or anywhere in the canal where they may interfere with navigation to or from piers or industrial plants is prohibited.

(11) Turning. Vessels exceeding 100 feet in length shall not turn around, or attempt to turn around, in the concrete revetted portions of the canal at the Fremont Cut or Portage Cut sections of the canal.

(12) Excessive working of propellers or engines. Excessive working of the propellers of a vessel for purposes of testing or for other purposes when this creates objectionable or dangerous currents in the canal is forbidden. In case of grounding, the rapid or strong working of the vessel's engines is forbidden.

(13) Landing or mooring. No business, trading, or landing of passengers, freight, or baggage will be allowed on or over the canal piers or lock walls, or over the piers or grounds forming a part of the canal or its appurtenances. All persons in charge of or employed on any boat are prohibited from landing or mooring such boat at any of the canal piers, unless in transit through the canal or specially permitted to do so by the District Engineer or his authorized assistants.

(14) Deposit of refuse. The deposit, either from watercraft or from the shore, of any oil or refuse matter in the canal or upon the canal grounds is prohibited, nor shall water discharged from the side of a vessel be allowed to spill on the lock wall.

(15) Aids to navigation. Persons in charge of log rafts or other tows, and the masters of vessels and boats using the canal, shall keep a careful watch when passing buoys or other aids to navigation and promptly report to the District Engineer or his authorized assistants any displacement or damage to such aids.

Note: Aids to navigation and other related data are shown on Nautical Chart No. 18447 published by the National Ocean Survey.

(16) Operation of salt water barrier in the large lock of the Hiram M. Chittenden Locks. (i) A salt water barrier is installed across the east end of the large lock. This barrier, while in the depressed position, reduces the depth of the water available at the east end of this chamber from 36 feet to 33.75 feet at low lake elevation (20 feet above MLLW). In the raised position, the depth of water will be reduced to 16 feet. In comparison, the depth of water available for navigation at the west end of the large lock chamber is 29 feet at mean lower low water. The purpose of this barrier is to reduce salt water intrusion into Lake Washington through normal operations of the locks.

(ii) The least depth of water available over the barrier when raised will be shown on signs placed near the ends of the guide piers to the large lock. A yellow light mounted on these signs will be lighted only while the barrier is in a raised position.

(iii) Vessels transiting the lock from east to west having draft requirements that exceed the water depth available over the barrier will advise the lockmaster by sounding one long and two short blasts of a horn or whistle. When the yellow light is extinguished on the signboard, the operator of the vessel may assume the barrier has been lowered.

(iv) Vessels transiting the lock from west to east having draft requirements that exceed the depth available over the intrusion barrier will advise the lockmaster by sounding one long and two short blasts of a horn or whistle. A yellow light mounted on a standard on the south lock wall and opposite the intrusion barrier will be lighted only when the barrier is in the raised position.

(v) It shall be the responsibility of the vessel operator to satisfy himself of the position of this barrier prior to passing over it.

(h) (Reserved)

(i) (Reserved)

(j) Port Orchard; naval restricted area–(1) The area. Shoreward of a line beginning at a point on the west shoreline of Port Orchard bearing 90° from stack (at latitude 47°42'01", longitude 122°36'54"); thence 90°, approximately 190 yards, to a point 350 yards from stack; thence 165°, 6,000 yards, to a point bearing 179°, 1,280 yards, from Battle Point Light; thence westerly to the shoreline at latitude 47°39'08" (approximate location of the Brownsville Pier).

(2) The regulations. (i) No vessel shall, at any time, anchor or tow a drag of any kind in this area.

(ii) The regulations in this paragraph shall be enforced by the Commandant, Thirteenth Naval District, or his authorized representative.

(k) Sinclair Inlet; naval restricted areas. (1) Area No. 1. All the waters of Sinclair Inlet westerly of a line drawn from the Bremerton Ferry Landing (approximately latitude 47°33'49"N., longitude 122°37'19"W.) southeasterly to the shoreline at latitude 47°32'53"N., longitude 122°36'54"W.

(2) Area No. 2. That area of Sinclair Inlet to the north and west of an area bounded by a line commencing at latitude 47°33'44"N., longitude 122°37'27"W.; thence to latitude 47°33'40"N., longitude 122°37'22.5"W.; thence to latitude 47°33'24"N., longitude 122°37'41"W.; thence to latitude 47°33'20"N., longitude 122°38'08"W.; thence to latitude 47°33'08"N., longitude 122°38'25"W.; thence to latitude 47°33'08"N., longitude 122°38'54"W.; thence to latitude 47°33'05"N., longitude 122°39'02.5"W.; thence to latitude 47'33'05"N., longitude 122°39'37"W.; and thence along the shoreline to the point of beginning. This line is located approximately 100 yards from the southerly end of the Naval Shipyard piers, drydocks or shoreline.

(3) The regulations (i) Area No. 1. No vessel of more than 100 gross tons shall enter this area or navigate therein without permission from the enforcing agency.

(ii) Area No. 2. Vessels and other craft, except those under the supervision of local military or naval authority, public vessels, and Horluck Transportation Company, Inc., and Washington State Ferries, shall not enter this area without permission from the enforcing agency.

(iii) The regulations in this paragraph shall be enforced by Commandant, Thirteenth Naval District, or his authorized representative.

(l) West Waterway, Seattle Harbor; navigation. (1) The movement of vessels of 250 gross tons or over and all vessels with tows of any kind through the narrow section of West Waterway between the bend at Fisher's Flour Mill dock and the bend at the junction of East Waterway with Duwamish Waterway, and through the draws of the City of Seattle and Northern Pacific Railway Company bridges crossing this narrow section, shall be governed by red and green traffic signal lights mounted on the north and south sides of the west tower of the City Light power crossing at West Spokane Street.

(2) Two green lights, one vertically above the other, displayed ahead of a vessel, shall indicate that the waterway is clear. Two red lights, one vertically above the other, displayed ahead of a vessel, shall indicate that the waterway is not clear.

(3) A vessel approaching the narrow section and drawbridges from either end of the waterway shall give one long blast of a whistle and shall not enter the narrow section until green lights are displayed.

(4) One vessel may follow another vessel in either direction, but the channel shall not be kept open in the same direction for an unreasonable time if a vessel is waiting at the other end.

(5) Tugs, launches, and small craft shall keep close to one side of the channel when vessels or boats with tows are passing.

(6) All craft shall proceed with caution. The display of a green light is not a guarantee that the channel is clear of traffic, and neither the United States nor the City of Seattle will be responsible for any damage to vessels or other property which may be chargeable to mistakes in the operation of the signal lights or to their failure to operate.

(m) (Reserved)

(n) Carr Inlet, naval restricted area–(1) The area. The waters of Carr Inlet bounded on the southeast by a line running from Gibson Point on Fox Island to Hyde Point on McNeil Island, on the northwest by a line running from Green Point (at latitude 47°16'54"N., longitude 122°41'33"W.) to Penrose Point; plus that portion of Pitt Passage extending from Carr Inlet to Pitt Island, and that portion of Hale Passage extending from Carr Inlet southeasterly to a line drawn perpendicular to the channel 100 yards northwesterly of the Warren dock.

(2) The regulations. (i) The area shall be used as an acoustic range for research studies and special noise trials. No explosives shall be used.

(ii) No marine craft of any type shall at any time approach or remain within one hundred yards of the hydrophone buoys or the hydrophone cable connection house. The hydrophone buoys will be anchored in Carr Inlet on a line perpendicular to the course line opposite Ketner's Point, and about one mile from the Fox Island shore. The course line, or range, will bear 134°38'21" (314°38'21") true, and will be marked by range beacons erected near the shore line approximately one mile north-northeast of Steilacoom and approximately two miles north-northeast of Home. The cable connection house will be framed on piling in Carr Inlet approximately 20 yards off the Fox Island shore, opposite Ketner's Point.

(iii) The remainder of the area shall be open to navigation at all times except when the range is in use or when hydrophones are being calibrated. When the range is in use or hydrophones are being calibrated, revolving beacon lights will be displayed on the following signal towers:

Signal Tower No. 1; Gibson Point; visible sector (bearings true), 039° to 285°.

Signal Tower No. 2; Fox Island, 2,500 yards northwest of Ketner's Point; visible sector (bearings true), 295° to 111°.

Signal Tower No. 3; Green Point; visible sector (bearings true), 135° to 339°.

Signal Tower No. 4; Penrose Point; visible sector (bearings true), 319° to 120°, and 000° to 050°.

Signal Tower No. 5; Pitt Island; visible sector (bearings true), 000° to 050°, and 199° to 225°.

Signal Tower No. 6; Hyde Point; visible sector (bearings true), 059° to 235°.

The beacon lights on Towers Nos. 1, 4, 5, and 6 will be red, and on Towers Nos. 2 and 3 will be either red or green. The beacon lights will show 1 quick flash every 10 seconds. The lights will be obscured except for the above tabulated visible sectors. The ranging of vessels or calibration of hydrophones requiring restrictions will be conducted at intervals during two 3-hour periods, that is, between the hours of 9 a. m. to 12 noon and 1 p. m. to 4 p. m., Monday through Friday, except for national holidays consisting of New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, and Christmas Day and will total approximately 150 days spread throughout the year. Shutting off of beacon lights will indicate termination of use of the range for the remainder of that period. Insofar as possible, the schedule of operations giving the days the range will be in use for each forthcoming month will be published in local newspapers and in the local U.S. Coast Guard Notice to Mariners.

(iv) When the red beacon lights are displayed indicating that the range is in use or hydrophones are being calibrated, navigation within the area will be restricted as follows:

(a) As used in this section, the words "operate, power vessel and non-power vessel" are defined as follows:

(1) "Operate": To be physically present in the designated area.

(2) "Power vessel": A vessel propelled principally by a mechanical propulsion system (i.e., gasoline, Diesel, steam or electric drive to a propeller, pump jet, paddle wheel or other device), and being propelled by that means.

(3) "Non-power vessel": A vessel not equipped with a mechanical propulsion system, such as a rowboat, canoe or sailboat propelled by oars, paddles, or sails, respectively.

(b) Power vessels shall not operate within the area, except that traffic in either direction between Hale Passage and upper Carr Inlet, within 200 yards of the low water mark off Green Point, will be cleared by signal for approximately 15 minutes total time within this area at the termination of individual ranging runs, while the vessel being ranged takes position for the next run. Clearance to traverse the area around Green Point will be indicated by extinguishing the red beacon lights and displaying the green beacon lights on Signal Tower No. 2 on Fox Island and Signal Tower No. 3 on Green Point.

(c) Non-powered marine craft shall not operate within one mile of the course line bearing 134°38'21" (314°38'21") true, and within two miles to the southeast and two miles to the northwest of the hydrophone buoys situated in Carr Inlet opposite Ketner's Point: Provided however, Non-powered craft may operate within four hundred yards of the low water mark on the northeast side of McNeil Island, within two hundred yards of the low water mark at Green Point, and within two hundred yards of the low water mark on the southwest shore of Fox Island except for maintaining the required one-hundred yard clearance around the cable connection house. (See paragraph (n) (2) (ii) of this section.)

(d) Towboats shall have free access and egress to designated tow havens within Carr Inlet, as follows: The Navy will establish and maintain suitable mooring buoys for the use of tugs and their tows at the following points: (1) Approximately 1,500 yards northwest of Gibson Point Light and approximately 400 yards offshore from the low water mark on the Fox Island shore; (2) approximately 1,500 yards northwest of Hyde Point and approximately 400 yards offshore from the low water mark on McNeil Island shore; (3) and at a point midway between the north point of Gertrude Island and the northwest point of Still Harbor. Towboats will signal by radio, telephone or visual flag hoist as far in advance as possible of the time they enter the tow haven, such signals to be directed to the range instrument vessel to be located on the Fox Island side of Carr Inlet. The Navy shall promptly suspend operations when necessary to permit the access and egress of such tow traffic, and shall signal the tows when the area is clear.

(e) Through commercial traffic, including tows, to points within Carr Inlet, and through Carr Inlet, Pitt Passage and Hale Passage to adjacent waters will be permitted free access and egress, as follows: Such traffic will signal by radio, telephone or visual flag hoist as far in advance as possible of the time they enter the area, such signals to be directed to the range instrument vessel to be located on the Fox Island side of Carr Inlet. The Navy shall promptly suspend operations when necessary to permit the passage of such traffic, and the instrument vessel shall signal when the area is clear for passage.

(f) The warden of the McNeil Island penitentiary and his authorized representatives shall be permitted to operate within the area at any time, as may be necessary, for the patrol and search for escaped convicts.

(g) Red or green signal flags will be displayed on the signal towers in case of failure of the red or green beacon lights. The display of the signal flags at the top of the flag masts will have the same significance as the beacon lights.

(3) The regulations in this paragraph shall be enforced by the Commandant, Thirteenth Naval District, and such agencies as he may designate.

(o) Dabob Bay, Whitney Point, Naval Restricted Area–(1) The area. Beginning at the high water line along the westerly shore of Dabob Bay, 100 yards northerly of the Naval control building located at approximately N. latitude 47°45'36" and W. longitude 122°51'00", thence S. 89°59'E. 2000 yards, thence to S. 00°01'W. 200 yards thence N. 89°59'W. approximately 2000 yards to the high water line 100 yards southerly of the control building.

(2) The regulations. (i) No vessel shall, at any time, anchor or tow a drag of any kind in this area.

(ii) The regulations in this paragraph shall be enforced by the Commandant, Thirteenth Naval District, or his authorized representative.

(p) Port Townsend, Indian Island, Walan Point, Naval Restricted Area–(1) The area. The waters of Port Townsend bounded by a line commencing on the north shore of Walan Point at latitude 48°04'41"N., longitude 122°44'26"W.; thence to latitude 48°04'46"N., longitude 122°44'53"W.; thence to latitude 48°04'19"N., longitude 122°45'05"W.; thence to latitude 48°04'15"N., longitude 122°44'48"W.; thence to a point on the Walan Point shoreline at latitude 48°04'18"N., longitude 122°44'48"W.; and thence along the shoreline to the point of beginning. This line is located approximately 200 yards from the face and ends of the pier.

(2) This regulation. No vessel shall enter this area without permission from the Commandant, Thirteenth Naval District, or his authorized representative. This restriction shall apply during periods when ship loading and/or pier operations preclude safe entry. These periods will be identified by flying a red flag from the ship and/or pier. A yellow flag will be displayed 24 hours in advance of the restricted periods.

§207.770 Snoqualmie and Snohomish Rivers, Wash.; logging. Loose logs may be floated in navigable parts of the Snoqualmie and Snohomish Rivers under the following conditions:

(a) All loggers and river drivers operating on the Snoqualmie and Snohomish Rivers shall be required to register at the United States Engineer Office, Seattle, Wash., giving the firm name, manager's name, and post office address.

(b) No logs shall be dumped into the rivers or released from storage booms without being turned over to a registered driving company, firm, or individual.

(c) River drivers authorized to operate on these streams must maintain a sufficient organization of boats and experienced workmen to care for the drives of their customers.

(d) River drivers shall so conduct their operations that all parts of the river will be effectively patrolled and the formation of jams prevented.

(e) During times of freshet, river drivers shall increase their force and station men at critical points where jams are liable to form.

(f) Loggers who entrust their logs to river drivers will be required to satisfy themselves that their logs are being driven in accordance with this section, and if continued unconcern on their part results in confusion, the privilege of dumping logs into the stream shall be denied to them.

(g) Hemlock logs that will not float for their entire length shall not be deposited in the rivers.

§207.780 Sammamish River, Wash.; logging. Logs may be floated on Sammamish River between Lakes Sammamish and Washington under the following conditions:

(a) At least once every 6 months all loggers, log owners, and river drivers operating on the Sammamish River shall be required to register at the United States Engineer Office, Seattle, Wash., giving full name and post office address.

(b) Logs run from Lake Sammamish shall be in charge of a competent driving crew and kept continuously on the move while in transit.

(c) Loggers putting logs into Sammamish River shall inclose their logs in pocket booms along the bank of the river, and these pocket booms shall be so arranged that a free passageway of ruling depth, at least 12 feet wide, shall be left between the boom and opposite shore.

(d) When logs are released from pocket booms they shall be placed in charge of a competent driving crew and kept continuously on the move to Lake Washington or to the mills located on Sammamish River.

(e) Should a blockade of logs occur in the river at any time, each logger whose brand appears on any of the logs in said blockade shall discontinue dumping logs into the river until the blockade has been broken.

(f) Log drivers who indifferently operate, or who delay the transit of logs, will be denied the privilege of operating in such capacity on this stream.

(g) To make unnecessary the present practice of storing logs in the Sammamish River, no logs will be started down this stream until provision has been made for boom sticks at the mouth sufficient to hold the entire drive or other means of storage provided.

§207.806 Pacific Ocean, at Barbers Point, Island of Oahu, Hawaii; restricted area. (a) The area. That portion of the Pacific Ocean lying offshore of Oahu between Ewa Beach and Barbers Point, basically outlined as follows:

Station
A (shoreline)–21°18'06"N., 158°04'24"W.
B–21°17'00"N., 158°03'30"W.

C–21°15′00″N., 158°03′18″W.
D–21°15′36″N., 158°01′06″W.
E (shoreline)–21°18′30″N., 158°02′00″W.

(b) The regulations. (1) Vessels shall not anchor within the area at any time.

(2) Dredging, dragging, seining, or other fishing operations which might foul underwater installations within the area are prohibited.

(3) Use of the restricted area for boating, fishing (except as prohibited in paragraph (b)(2) of this section) and other surface activities is authorized.

(4) The regulations in this section shall be enforced by Commander, Fleet Training Group, Pearl Harbor, Hawaii 96860, and such agencies as he/she may designate.

§207.807 Pacific Ocean, at Makapuu Point, Waimanalo, Island of Oahu, Hawaii, Makai Undersea Test Range. (a) The restricted area. The waters within an area beginning at a point in latitude 21°18′50″N., longitude 157°39′07″W.; thence to latitude 21°20′33″N., longitude 157°38′00″W.; thence to latitude 21°22′02″N., longitude 157°39′07″W.; and thence to latitude 21°19′35″N., longitude 157°40′46″W.

(b) The regulations. (1) During critical testing phases of surface and submerged units, the operating officials of the Makai Test Range will mark in a conspicuous manner the location of the equipment which might be subject to damage from navigation and fishing activities or might represent a hazard to persons or property in the vicinity. During the display of signals in the restricted area, all surface craft will remain away from the area until such time as the signals are withdrawn. At all other times the area is open to unrestricted fishing, boating and general navigation.

(2) Operating officers and personnel of the Makai Test Range will be responsible for marking in a conspicuous manner the location of surface and underwater equipment which is subject to damage from navigation and fishing activities in the vicinity or represents a hazard to persons or property in the vicinity, and the location of the work area during critical testing phases. Surface communication by boat will be provided by the Makai Test Range during testing phases.

Part 209–Administrative Procedure(Shipping Safety Fairway)

§209.138 Shipping Safety Fairway in the Pacific Ocean at Port Hueneme, Calif. (a) Purpose. The fairway area as described in this section is established to control the erection of structures therein to provide a safe approach to the entrance to Port Hueneme.

(b) Permits. Department of the Army permits are required pursuant to law (30 Stat. 1151; 33 U.S.C. 403) and (67 Stat. 462; 43 U.S.C. 1333 (f)) for work or structures in the Pacific Ocean in coastal waters and the waters covering the Outer Continental Shelf. The Department of the Army will grant no permits for the erection of structures in the fairway area, since structures located therein would constitute obstructions to navigation.

(c) Modification of the area. The fairway is subject to modification, but only after due notification and consideration of the views of interested parties, and advance publication of any adverse determination (see §209.520 of this part for notice of proposed rule making).

(d) The fairway. An area one nautical mile in width centered on the alinement of Port Hueneme Entrance Channel and extending seaward from the 30-foot-depth curve for a distance of 1.5 nautical miles, thence turning southerly and widening to 1.5 nautical miles at the 3-mile limit, all between lines joining the following points:

A–34°06′30″N., 119°15′00″W.
B–34°07′37″N., 119°14′25″W.
C–34°08′49″N., 119°13′21″W., thence generally along the 30-foot-depth curve to the seaward end of the west entrance jetty; seaward end of the east entrance jetty, thence generally along the 30-foot-depth curve to:
F–34°08′21″N., 119°12′15″W.
G–34°07′10″N., 119°13′20″W.
H–34°05′48″N., 119°13′23″W.

3. CALIFORNIA, OREGON, AND WASHINGTON

The California-Oregon-Washington coast of the United States, between Mexico on the S and Canada's British Columbia on the N, is mostly rugged and mountainous, with high land rising abruptly from the sea in many places. S of San Francisco Bay the mountains are usually bare or covered with chaparral and underbrush. N of the bay the mountains are generally well timbered, and in some places, especially N of the Columbia River, the timber is particularly dense and heavy.

Dump Sites and **Dumping Grounds**.–These areas are rarely mentioned in the Coast Pilot, but are shown on the nautical charts. (See Dump Sites and Dumping Grounds, chapter 1, and charts for limits.)

Aids to navigation.–Lights are numerous along the coast; there are only a few places where a vessel is not in sight of one or more lights. Radiobeacons and fog signals are at most of the principal light stations. Marker radiobeacons, low-powered and for local use only, are at many small-craft harbors and at other points along the coast. Many coastal and harbor buoys are equipped with radar reflectors, which greatly increase the range at which the buoys may be detected. Loran coverage is good. The critical dangers are buoyed and are generally marked by kelp.

There are many aerolights along the coast that are useful for navigation purposes, but they should not be confused with the marine lights. (See the Light List for a complete description of navigational aids.)

Electronic navigation.–Radar, loran, and the radio direction finder have given the navigator means of determining his position in any weather. The mariner should, however, appreciate the limitations and sources of error of the various systems. Radar should be properly calibrated and tuned. Radio direction finders must be calibrated, and the operator should become experienced in the use of the equipment. Radar, radio direction finder, and loran equipment are subject to malfunctions which may not be immediately apparent to the operator, and there are conditions when loran or radio signals may be subject to error when the shipboard receiver is operating properly. Soundings should always be taken in critical places, and the position should be checked by visual bearings when possible.

Radar navigation is facilitated along the Pacific coast by the generally high relief of the coastline. The rugged coast provides many points, headlands, and large offshore rocks which give accurate radar ranges and bearings. Radar ranges are more accurate than radar bearings. When two or more suitable targets can be positively identified, a better fix is obtained by radar ranges alone than by radar ranges and bearings. When visibility permits, visual bearings should always be taken. When positioning by a bearing and a radar range of a single object, the identification of the target must be positive. Floating aids to navigation should not be used as targets for fixing position.

Radio direction finder equipment is subject to several kinds of errors. Bearings obtained at twilight or at night or bearings which are almost parallel to the coast should be accepted with reservations, due to "night effect" and to the distortion of the radio waves if traveling overland. Other sources of error in the system may be avoided by the proper calibration of the shipboard receiver.

Loran provides good coverage along the Pacific coast.

The frequent occurrence of fog along this coast makes radar an invaluable aid in detecting other traffic and obtaining a line of position and/or fix. Bridge-to-bridge radio communication (VHF-FM) is another useful aid, regardless of weather, in waters where maneuvering room is limited or restricted. The use of VHF-FM equipment for short-range communication is increasing, and so are the number of vessels equipped with this equipment. The primary advantages of this radio system are its line-of-sight characteristic and relative freedom from static interference.

COLREGS Demarcation Lines.–Lines have been established to delineate those waters upon which mariners must comply with the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) and those waters upon which mariners must comply with the Inland Navigational Rules Act of 1980 (Inland Rules). The waters inside of the lines are **Inland Rules Waters,** and the waters outside of the lines are **COLREGS Waters.** (See Part 80, chapter 2, for specific lines of demarcation.)

Vessel Traffic Management.–(See **Part 161, Subpart A,** chapter 2, for regulations requiring notifications of arrivals, departures, hazardous conditions, and certain dangerous cargoes to the Captain of the Port.)

Channels.–Federal project depth is the dredging depth of a channel as authorized by an Act of Congress upon recommendation of the Chief of Engineers, U.S. Army. **Controlling depth** in a channel is its least depth; it restricts use of the channel to drafts less than that depth.

Where deepwater channels are maintained by the Corps of Engineers and the controlling depths are printed on the charts, the Coast Pilot usually gives only the project depth. Owing to constant shoaling in places, depths may vary considerably between maintenance dredgings. (See Notice to Mariners and latest editions of charts for controlling depths.)

Where secondary channels are maintained regularly by the Corps of Engineers, the Coast Pilot gives the controlling depths together with the dates of the latest surveys.

In the case of other channels, the controlling depths printed in the Coast Pilot are from the latest available reports, which may, however, be several years old.

Depths alongside wharves.–In general, depths given alongside wharves are those reported by owners and/or operators of the waterfront facilities, and have not been verified by government surveys. Since these depths may be subject to change, local authorities should be consulted for current controlling depths.

Depths are in feet below the low-water tidal datum of the charts; deck heights where given are in feet above the chart datum for water depths.

Traffic Separation Schemes (Traffic Lanes) have been established from the Gulf of Santa Catalina to the vicinity of Point Conception, off the entrance to San Francisco Bay, and in Puget Sound/San Juan Islands. (See chapters 4, 7, and 12, respectively, for details.)

Vessel Traffic Services (VTS), have been established in the San Francisco Bay area and in the Strait of Juan de Fuca, E of Port Angeles and in the waters of Rosario Strait, Admiralty Inlet, Puget Sound and the navigable waters adjacent to these areas. The services have been established to prevent collisions and groundings and to protect the navigable waters from environmental harm.

The Vessel Traffic Services provide for a **Vessel Traffic Center (VTC)** that may regulate the routing and movement of vessels by radar surveillance, movement reports of vessels, VHF-FM radio communications, and specific reporting points. The systems consists of traffic lanes, separation zones, precautionary areas and reporting points.

The Vessel Traffic Service (San Francisco) is voluntary. (See chapter 7, for details.) The Vessel Traffic Service in the Strait of Juan de Fuca, E of Port Angeles, and in the waters of Rosario Strait, Admiralty Inlet, and Puget Sound is mandatory. (See 161.101 through 161.189, chapter 2, for rules governing vessel operations in the Vessel Traffic Service, and, chapter 12, for details.)

Bridges.–General drawbridge regulations for bridges are given in 117.1 and 117.1a, chapter 2. Bridge opening signals and other details concerning specific bridges are also given in chapter 2; reference to the particular section in chapter 2 containing this information is made in the Coast Pilot under the name of the bridge or the waterway over which the bridge crosses.

Depths along most of the Pacific coast decrease much too rapidly from seaward to be of any practical use as an aid to navigation. The 100-fathom curve lies at an average distance of less than 10 miles from shore, but this distance is exceeded in the approaches to San Francisco Bay. Hecata Bank, Columbia River, and the Strait of Juan de Fuca.

Anchorages, affording shelter for large vessels from the severe NW winds of summer, may be had in a number of places along the coast. In SE and SW weather there are few places where shelter is available; San Diego Bay, Los Angeles Harbor, the lee side of the Channel Islands, and Monterey Bay are the only places S of San Francisco Bay. N of San Francisco, good shelter is found in Humboldt Bay, Coos Bay, Columbia River, Willapa Bay, and Grays Harbor; but most of these places must be made before the sea rises, as afterward the bars become impassable. Neah Bay, just inside the entrance to the Strait of Juan de Fuca, is used considerably by small vessels in W or S weather. Many anchorages have been established in the area covered by this Coast Pilot. (See Part 110, chapter 2, for limits and regulations.)

Dangers.–There are few outlying dangers, the principal ones being Bishop Rock, W of San Diego; Noonday Rock and the Farallon Islands, off San Francisco Bay; and Blunts, St. George, Rogue River, Orford, and Umatilla Reefs, N of San Francisco. The Channel Islands, off southern California, are the largest, most prominent, and the farthest offshore of any islands along the coast.

Oil well structures.–Offshore drilling and exploration operations are increasing in the waters off California, especially in Santa Barbara Channel.

Obstructions in these waters consist of submerged wells and oil well structures (platforms), including appurtenances thereto, such as mooring piles, anchor and mooring buoys, pipes, and stakes.

In general, the oil well structures (platforms), depending on their size, depth of water in which located, proximity of vessel routes, nature and amount of vessel traffic, and the effect of background lighting, may be marked in one of the following ways:

Quick flashing white light(s) visible at least 5 miles: fog signal sounded when visibility is less than 5 miles.

Quick flashing white light(s) visible at least 3 miles: fog signal sounded when visibility is less than 3 miles.

Quick flashing white or red lights visible at least 1 mile: may or may not be equipped with fog signal.

Structures on or adjacent to the edges of navigable channels and fairways, regardless of location, may be required to display lights and fog signals for the safety of navigation.

Associated structures within 100 yards of the main structure, regardless of location, are not normally lighted but are marked with red or white retro-reflective material. Mariners are cautioned that uncharted submerged pipelines and cables may exist in the vicinity of these structures, or between such structures and the shore.

During construction of a well or during drilling operations, and until such time as the platform is capable of supporting the required aids, fixed white lights on the attending vessel or drilling rig may be shown in lieu of the required quick flashing lights on the structure. The attending vessel's foghorn may also be used as a substitute.

Submerged wells may or may not be marked depending on their location and depth of water over them.

All obstruction lights and fog signals, used to mark the various structures, are operated as privately maintained aids to navigation. (See 33 CFR 67, for detailed regulations for the marking of offshore structures.)

Information concerning the establishment, change, or discontinuance of offshore oil-well structures and their appurtenances is published in the Local Notice to Mariners or by Broadcast Notice. Additional information may also be obtained from the Coast Guard Commander. Mariners are advised to navigate with caution in the vicinity of these structures and in those waters where oil exploration is in progress, and to use the latest and largest scale chart of the area.

During the continuing program of establishing, changing, and discontinuing oil-well structures, special caution should be exercised when navigating the inshore and offshore waters of the affected areas in order to avoid collision with any of the structures.

Information concerning seismographic operations is not published in Notice to Mariners unless such operations create a menace to navigation in waters used by general navigation. Where seismographic operations are being conducted, casings (pipes), buoys, stakes, and detectors are installed. Casings are marked with flags by day and fixed red lights by night; buoys are colored international orange and white horizontal bands; and stakes are marked with flags.

Pipelaying barges.–With the increased number of pipeline laying operations, operators of all types of vessels should be aware of the dangers of passing close aboard, close ahead, or close astern of a jetbarge or pipelaying barge. Pipelaying and jetbarges usually move at 0.5 knot or less and have anchors which extend out about 3,500 to 5,000 feet in all directions and which may be marked by lighted anchor buoys. The exposed pipeline behind the pipelaying barge and the area in the vicinity of anchors are hazardous to navigation and should be avoided. The pipeline and anchor cables also represent a submerged hazard to navigation. It is suggested, if safe navigation permits, for all types of vessels to pass well ahead of the pipelaying barge or well astern of the jetbarge. The pipelaying barge, jetbarge, and attending vessels may be contacted on VHF-FM channel 16 (156.80 MHz) for passage instructions.

Fish havens, some marked by private buoys, are numerous along the Pacific coast. Navigators should be cautious about passing over fish havens or anchoring in their vicinity.

Kelp grows on nearly every danger with a rocky bottom and is particularly heavy at various points in Santa Barbara Channel and in the vicinity of San Diego Bay. It will be seen on the surface of the water during the summer and autumn; during the winter and spring it is not always to be seen, especially where it is exposed to a heavy sea. Many rocks are not marked by kelp, because a heavy sea will occasionally tear it away and a moderate current will draw it under water so that it will not be seen. When passing on the side of a kelp patch from which the stems stream away with the current, care should be taken to give it a good berth. Dead, detached kelp floats on the water curled in masses, while live kelp, attached to rocks, streams away level with the surface. Live kelp is usually an indication of depths less than 10 fathoms.

Logs and deadheads.–Mariners are cautioned that a large number of logs and deadheads are adrift in the navigable water of Washington and Oregon at all times, particularly after storms, spring freshets, and unusually high tide. Mariners are urged to be alert for the presence of such logs and deadheads, as they constitute a serious menace to craft of small and moderate size.

River entrances.–Along the Oregon and Washington coast, bars build up at the mouths of the many rivers and streams that empty into the Pacific Ocean. The tidal currents at these entrances can obtain considerable velocity, especially when the ebb tide is reinforced by the river runoff. The most dangerous condition prevails when a swift ebb current meets the heavy seas rolling in from the Pacific at the shallow river entrances. The water piles up and breaks and creates a bar condition too rough for small craft. In a bar area, sea conditions can change rapidly and without warning. Always cross it with caution.

Regulated Boating Areas.–The U.S. Coast Guard has provided for the termination of the use of boats during especially hazardous conditions on certain river bars and coastal inlets along the Pacific coastline of Oregon and Washington. The hazardous bar areas are depicted in the Coast Guard "Bar Guides" or in a pamphlet entitled "Boating in Coastal Waters," published by the Oregon Marine Board. It is important for the small-craft operator to know when he is operating in the general vicinity of a regulated boating area, and be prepared for any changing tidal or sea conditions which may be hazardous to his vessel.

(For regulations and limits of Regulated Boating Areas, see 33 CFR 177.08.)

Danger zones and **Restricted areas** are along the Pacific coast, around the Channel Islands, in the Straits of Juan de Fuca and Georgia, and in Puget Sound. (See 33 CFR 204 and 207, chapter 2, for limits and regulations.)

Caution.–Heavy concentrations of fishing gear may be expected off Drakes Bay, Grays Harbor, Columbia River, Coos Bay, Humboldt Bay and Destruction Island between December 1 and August 15, from shore to about 30 fathoms.

To reduce the destruction of fishing gear by vessels and to reduce the fouling of propellors and shafts by fishing gear, the Oregon State University Extension Service has coordinated an agreement between towboaters and pot fishermen (crab and black cod) for the establishment of towboat lanes along the Pacific Coast between Half Moon Bay, California and Destruction Island, Washington. Copies of the agreement showing fishing areas and towboat lanes may be obtained from the Oregon State University Extension Service, Corvallis, Oreg. 97331.

Tides.–A very important characteristic of the tides along the W coast of the United States is the large inequality in the heights of the two high waters and of the two low waters of each day. On the outer coast the average difference between the heights of the two high waters of the day is from 1 to 2 feet, and the average difference in the heights of the two low waters from 2 to 3 feet. It was because of this large difference in the low-water heights that the mean of the lower low waters, rather than the mean of all low waters, was adopted as the plane of reference for the charts of this region.

This inequality changes with the declination of the Moon. When the Moon is near the Equator the inequality is relatively small; but when the Moon is near its greatest N or S declination, the difference in the heights of the two high waters or of the two low waters of each day reaches a maximum. The tides at this time are called **Tropic tides.**

Off the outer coast, the mean rise of the tide varies from 5 feet off southern California to about 7.5 feet off the coast of Washington. Extreme variations from 3 feet below to 10 feet above the datum may reasonably be expected.

At the entrance to San Francisco Bay the mean rise of the tide is about 5 feet. At the S end of the bay the tide occurs about 1½ hours later, and the mean rise is about 2.5 feet greater than at the entrance of the bay. Passing N into San Pablo Bay, the tide occurs from 1 to 2 hours later than at the Golden Gate, with a mean rise of about 0.5 foot greater than at the latter place. In Suisun Bay the time of tide is about 3 hours later than at the Golden Gate, with a mean rise about the same. It requires about 4 hours for high water to pass from Suisun Bay to Stockton, on the San Joaquin River, and about 5 hours from Suisun Bay to Sacramento, on the Sacramento River. The mean rise of the tide at Stockton is 3.6 feet, and at Sacramento is 2.6 feet.

In Humboldt Bay the tide is from ½ to 1 hour later than on the outer coast. The mean rise is about 6 feet.

In Coos Bay the tide is from ½ to 1½ hours later, and the rise of high water about same as in Humboldt Bay.

In Yaquina Bay the mean rise is about 7 feet.

At the entrance to Columbia River the mean rise is about 7 feet. It requires about 6 hours for high water to pass from the entrance to the Columbia River to the mouth of the Willamette River. In passing up the Columbia River the range of tide decreases until it is only 1.4 feet at the mouth of the Willamette. Above this point the tidal range becomes too small to be of practical importance. There are, however, large fluctuations in the level due to meteorological conditions. An extreme variation of 24.5 feet has been noted at St. Johns on the Willamette River. Columbia River is usually highest during May, June, and July, and lowest during September, October, and November.

In Willapa Bay and in Grays Harbor the mean rise is about 9 feet.

Passing through the Strait of Juan de Fuca, the tide occurs about 3 hours and 40 minutes later at Port Townsend than at Cape Flattery. The mean rise increases from 7.2 feet above the datum at Cape Flattery to 7.9 feet at Port Townsend. There is an increase in the average inequality between the two low waters of each day from 3 feet at Cape Flattery to 5 feet at Port Townsend. The average inequality between the two high waters of each day at both places is about 1.5 feet.

In Puget Sound the tide is about ½ to 1 hour later than at Port Townsend. The mean rise increases from 7.5 feet at Port Townsend to 13.5 feet at Olympia. In Puget Sound the average difference between the two low waters of each day is 6 feet. At Seattle an extreme range from 4.5 feet below the datum of mean lower low water to 15 feet above the same datum has been observed. At Olympia, in the S part of the sound, an extreme high water 18 feet above the datum has been noted.

In the San Juan Islands, the mean rise of the tide varies from 6.5 to 8 feet. An extreme range from 4.5 feet below to 12 feet above the same datum may reasonably be expected.

Caution.–In using the Tide Tables, high or low water should not be confused with slack water. For ocean stations there is usually little difference between the time of high or low water and the beginning of ebb or flood currents; but for places in narrow channels, landlocked harbors, or on tidal rivers the time of slack water may differ by several hours from the time of high or low water stand. The relation of the times of high and low water to the turning of the current depends upon a number of factors, hence no simple rule can be given. (See the Tidal Current Tables for predicted times of slack water or strength of current.)

Currents.–A current, the outer limit of which extends offshore more than 300 miles, flows approximately parallel to the U.S. Pacific coast from latitude 50° to 30°N. The direction of the current is generally S throughout the year except as noted below. Its velocity, which averages about 0.2 knot, is greatly influenced by prevailing winds; N winds increase it, and S winds diminish it. North of latitude 45°N. the set is usually N from November through February.

Along the coast during certain periods there is a weak N flow known as the **Davidson Inshore Current,** which is evident between San Diego and Point Conception from July through February and between Point Conception and Cape Flattery from November through February.

Along the coast of Vancouver Island there is usually a NW flow, which as measured at Swiftsure Bank (48°32.0'N., 124°59.7'W.) has a velocity of nearly 0.5 knot at all seasons.

The above statements apply to general or average conditions. The currents, particularly offshore, at a specific time depend largely upon prevailing winds, whereas alongshore and off the entrances to inland waterways they depend also upon tidal and drainage effects. (See the Tidal Current Tables for detailed information.)

Tsunamis (seismic sea waves).–Although the coasts of California, Oregon, and Washington are not generally subject to waves of the magnitude which strike the Hawaiian Islands and other Pacific areas, widespread damage to shipping and to waterfront areas occasionally occurs. The tsunami of March 28, 1964, originating in the Gulf of Alaska, caused 16 deaths and several million dollars damage to ships and property in California, Oregon, and Washington. The loss of life and property can be lessened if shipmasters and others acquaint themselves with the behavior of these waves so that intelligent action can be taken when they become imminent. (See chapter 1 for details about these waves.)

The Warning System operated by the National Oceanic and Atmospheric Administration and described in chapter 14 supplies warnings to the Civil Defense authorities in California, Oregon, and Washington who are responsible for disseminating this information to the affected areas. The warnings are also broadcast by the National Weather Service on NOAA Weather Radio.

When a warning is received, persons should vacate waterfront areas and seek high ground. The safest procedure for ships will depend on the amount of time available, and this may not always be known. A ship well out at sea would ride such waves safely, and hence if time is available to put to sea, that would be the safest action. On the other hand, the crew of a ship in harbor may have a difficult time averting serious damage. The ship may be washed ashore by incoming waves or grounded because of excessive withdrawal of water between crests. Much of the damage in the Los Angeles area during the 1960 Chilean tsunami was caused by rapid currents and the swift rise and fall of the water level that parted mooring lines and set floating docks and ships adrift.

Weather.–Climatological tables for coastal localities and meteorological tables for the coastal ocean area covered in this volume follow the appendix. The tables for the ocean area were compiled from observations made by ships in passage. Listed in the appendix are National Weather Service offices and radio stations which transmit weather information.

Storm warning display locations are listed on NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service. The Marine Weather Services Charts also show radio stations that transmit marine weather broadcasts and additional information of interest to mariners. These charts are for sale by the National Ocean Survey, Distribution Division (OA/C44) 6501 Lafayette Avenue, Riverdale, Md. 20737, and its authorized sales agents.

This section presents an overall, seasonal picture of the weather that can be expected in the offshore waters along the entire West Coast. Detailed information, particularly concerning navigational weather hazards, can be found in the appropriate coastal sections.

The Pacific coastal region of the United States and the adjacent ocean areas are located along the E portion of the Pacific high-pressure system. This high, when well developed, forms the principal circulation control forcing most of the low-pressure systems to follow a course to the N of the contiguous United States. This is reflected in the presence of the Aleutian low in the Gulf of Alaska. This action damps out weather changes that might otherwise occur and brings a stability factor that would not otherwise exist. Air which reaches the coast as a result of the prevailing westerly winds has acquired much moisture during its ocean passage, resulting in high humidities along the coast. The marine influence is also evidenced in a cooling effect in summer and a warming influence in winter.

Two features of the climate in these waters, while not commonplace, warrant the mariner's attention because of their severity. One is the tropical cyclones and the other a local wind known as the Santa Ana.

Tropical cyclones originate S of the area, off the west Mexican coast, in summer and autumn. About 15 form each season, of which 7 reach hurricane intensity. Few come far enough N to affect U.S. coastal waters. The ones that do have usually lost their hurricane intensity and are short-lived. However, these storms can be dangerous and have generated winds of more than 120 knots. Further reference is made to tropical cyclones in the seasonal description.

The **Santa Ana** is an offshore desert wind that occurs in or near San Pedro Bay. While infrequent, it may be violent; speeds have been measured at more than 50 knots. These winds diminish little, if any, immediately after passing over water, and can extend up to 50 miles out to sea. They are most likely in late autumn or winter. (See chapter 4 for more details.)

Winter, like an incoming tide, creeps over the northeastern North Pacific. Subtle changes begin in September. Then suddenly you're immersed. Breezes become gales. Rain is commonplace. Winds and cool temperatures make the air feel damp and chilly. Storms become routine. Choppy seas turn rough. Winter's harshness diminishes to the S. Seas off central and southern California come under the protection of a weak, good-weather subtropical high. Only enough storms penetrate this protective barrier to make winter a distinguishable season off southern California.

Winter storms usually work their way from the central Pacific northward into the Gulf of Alaska or to the coast of British Columbia, trailing their frontal systems across the area. Two or three times a month, on an average, a storm will move directly through the seas off the Washington-Oregon coast. The more seaward storms generate the moderate to strong SE through W winds that prevail over northern waters and influence the weather as far S as central California. The stronger winds that blow over a long fetch of water whip up rough seas. Seas of 12 feet or more are generated 15 to 20 percent of the time. In addition, the warm S flow brings cloudiness, drizzle, and sometimes fog. Drizzle occurs about 5 to 8 percent of the time, and there are about 2 to 4 days a month when dense fog reduces visibilities to 0.5 mile or less at sea. These conditions can persist for a week or more if one of these big storms stalls in the Gulf of Alaska. The S flow is also responsbile for air temperatures in the upper forties and fifties. Cold temperatures are unusual and are most likely when cold Arctic air is fed into a low in the gulf by a large high in the Bering Sea or when a rare outbreak of Arctic air occurs over the area. Temperatures at these times may drop below freezing off the Washington coast and into the upper thirties farther S. The infrequency of cold temperatures lessens the chances for snow, which is observed less than 2 percent of the time off Washington and less than 1 percent of the time off Oregon.

When a storm moves close or through these northern waters, weather changes rapidly. The center is preceded by a strong SE to SW flow that may reach gale force (gales occur on about 3 to 5 days per winter month) and may whip seas up to 20 feet or more; seas of these heights occur up to 4 percent of the time. These conditions are often accompanied by clouds and rain, with temperatures in the fifties. After the center passes, winds will veer to the W through N and remain strong for a while. Brief showers soon end, the clouds break, and temperatures drop into the low forties. A high-pressure system from the central Pacific may follow and bring a brief period of clear conditions. If a storm stalls or it is followed by a series of storms, bad weather can be prolonged for a week or more. Rain falls on 18 to 28 days per winter month in these N waters, and skies are overcast or obscured 40 to 50 percent of the time.

About once or twice a month, a storm moves into northern California offshore waters. While these lows are often weaker than those farther N, some cause gales and rough seas. Gales blow on 4 to 5 days per month, and seas reach 12 feet or more about 8 to 16 percent of the time. These conditions can also be generated by the interaction of a low to the N and a high to the S. The S winds can raise temperatures into the sixties off northern and central California. Clouds and rain accompany these systems. Rain falls on about 10 to 15 days per month.

Off northern and central California, storms bring a preponderance of SE through SW winds, but this is matched by NW and N winds that blow around the subtropical highs. These highs either form in the Pacific or migrate from Asia. They dominate the weather off the southern California coast, where W through N winds blow more than 60 percent of the time. However, these highs are weakest during winter, and occasionally storms move close enough to bring some clouds, rain, and wind. Rain occurs on about 5 to 10 days per month off central and southern California. Gales and rough seas are rare S of Los Angeles. Between Los Angeles and San Francisco, gales blow on about 1 to 4 days per month, while seas of 12 feet or more occur about 4 to 8 percent of the time.

Fog is a problem in the offshore waters between Los Angeles and San Francisco. Visibilities less than 2 miles occur 5 to 7 percent of the time, while dense fog reduces visibilities to less than 0.5 mile on 2 to 5 days per month.

Spring brings change. March is an epilog to winter, while May provides a prolog to summer. Cold rainy days alternate with mild sunny ones. The gradual changeover takes place under the forceful prodding of the expanding good-weather Pacific high. As the high expands, it forces the increasingly weak and infrequent storms N into the western Gulf of Alaska and Bering Sea. Since the high is not yet a permanent feature, storms will occasionally penetrate the area, particularly in early spring, when they sometimes move into the Pacific northwest or even across the northern California coast. Southern California waters remain protected by the high. This expanding high-pressure system, which brings good weather, creates a problem in the offshore waters of central and northern California. It causes a tightening of the pressure gradient, which increases wind strength. In other areas, winds and waves are becoming less of a problem. A change is taking place in the direction of prevailing winds. Off southern California, prevailing NW and N winds are becoming increasingly persistent. With the expansion of the high, N and NW winds are becoming the prevailing directions throughout the area. This is a slow change. In March, S and N winds share equal billing.

Storms to the W and NW of the Washington-Oregon offshore waters, while not as frequent as in winter, still generate SE to W winds as they work their way N. Not as many lows move directly through the area, and they are often less intense. Gales from these near and distant storms blow on about 2 days in March, and they are rare by May. Seas also calm down. In March, waves of 12 feet or more occur 15 to 20 percent of the time; this drops to 10 percent by April and to around 5 percent by May. The general S flow from these storms still bring rain, drizzle, and fog. Rain or drizzle can be expected on about 15 to 18 days in March and 9 to 15 days in May. Dense fog (visibilities less than 0.5 mile) forms on less than 2 days per month, while visibilities drop below 2 miles, 2 to 4 percent of the time. Because of the clouds and rain associated with this S flow, it is not always responsible for the warmest spring temperatures. Usually, it is accompanied by temperatures in the forties and low fifties in March and 50°F readings during May. An occasional cold N outbreak, usually following a storm, can drop March temperatures into the mid-to upper thirties.

Occasionally a low will move close enough to bring some clouds, rain, and drizzle; distant lows often account for some of the cloudy days. This is more likely in early spring, when rain falls on about 4 to 5 days in the S, and 5 to 15 days in central and N waters. By May, storms are less frequent, and rain occurs on just 1 or 2 days S of Los Angeles and 3 to 10 days to the N.

Fog is a problem in the offshore waters between Los Angeles and San Francisco. In April and May, visibilities drop below 2 miles 8 percent of the time, and fog reduces visibilities to less than 0.5 mile on about 2 to 3 days per month. It occurs mostly with winds from the SW through NW, when they bring warm air over the cooler waters.

Two important features are responsible for the summer weather in these offshore waters, the subtropical Pacific high and the cold California Current.

The influence of high-pressure systems becomes increasingly frequent in these N waters during spring. In fact, a principal path of highs from the central and western Pacific runs through this area and onto the Washington-Oregon coast. These systems bring clearing conditions, W through N winds, and sometime mild temperatures. Temperatures can, on occasion, get up into the upper fifties and low sixties in March and into the upper sixties in May. Clear to partly cloudy skies occur most often with W to N winds. Wind speeds are less than 10 knots most often with W to N winds.

High-pressure systems dominate the weather in California offshore waters, although an occasional storm disrupts the good weather, particularly in early spring. Wind and sea conditions are not so good, however, in waters from off San Francisco northward. In this region, the pressure gradient between highs and lows is often very tight, creating strong N winds which blow at speeds that average near 20 knots and whip up seas of 12 feet or more from 8 to 20 percent of the time. This situation continues throughout spring.

Conditions improve rapidly toward the S, where winds are lighter and seas calmer. The high-pressure systems are responsible for W through N winds, clear skies, and cool temperatures. Winds become increasingly persistent during spring, as the highs become more frequent. By May, NW through N winds are blowing close to 70 percent of the time N of San Francisco, and W through NW, about the same to the S. These winds blow over cold water and help keep temperatures in the fifties throughout the spring, N of San Francisco. Even to the S, temperatures in the fifties in March only climb into the midfifties to midsixties by May. This compares with temperatures in the 70° to 80° range at the same latitudes in North Atlantic offshore waters, where the Gulf Stream helps warm the air. The high-pressure systems are also responsible for the clear skies (about one-quarter cloud cover) that occur 25 to 50 percent of the time in these offshore California waters.

The high is made up of high-pressure systems, which either form in the Eastern Pacific or move into the area from Western Pacific waters, the Bering Sea, or the Gulf of Alaska. The S flowing California Current is partially driven by the clockwise circulation of these high-pressure systems. Upwelling also contributes to cool water temperatures. Sea-surface temperatures run 10° to 15°F. cooler than they do off the Atlantic coast. Its influence is so great that average air temperatures off Eureka never get out of the fifties, and extremes have only reached 76°F, just 10°F warmer than the January extreme. The California Current and coastal upwelling are responsible for the poor visibilities of summer and fall. The most dense and frequent fog occurs over the narrow stream of coldest water, just off the coast, and is often limited to a band of 50 miles or less. At other times, fog covers large areas, both in latitude and longitude, and may extend for hundreds of miles. Its effect is even more pronounced onshore, as you can read in the local chapters. The effect of the California Current in summer extends along the entire coast.

When a high sits to the W, which is most of the time in summer, W through N winds blow over the offshore waters. Between Point Arguello and Portland, this warm moist air is being chilled by the California Current. This results in not only cool temperatures but low clouds and fog. W through N winds blow 70 to 80 percent of the time. In the offshore waters, where merchant ships are trying to avoid poor visibilities, fog and haze are still encountered 30 to 40 percent of the time between Point Arguello and San Francisco. The fog reduces visibilities to below 0.5 mile up to 5 days per month. Skies are obscured by fog, or are overcast, up to 50 percent of the time in these offshore waters. Temperatures are often in the midfifties to midsixties at these times.

Between San Francisco and Portland, fog and haze occur 15 to 25 percent of the time. Fog reduces visibilities to below 0.5 mile on about 3 to 8 days per month. Skies are obscured or overcast about 30 to 40 percent of the time. In addition to fog, this offshore area is often plagued by gales and rough seas created by a tight pressure gradient between a high off the coast and a heat low over the southwestern United States and Mexico. Gales blow on about 4 to 6 days per month. Strong winds whip up seas of 12 to 20 feet about 3 to 10 percent of the time.

As storms become less frequent during summer, so does rain. By August, rain falls 3 to 7 percent of the time in the offshore waters from Point Arguello to Vancouver Island.

In the offshore waters between Portland and Vancouver Island, W and NW winds blow more than one-half of the time, skies are clear 20 to 30 percent of the time, and temperatures are frequently in the sixties. Gales are rare; and, while it rains 5 to 10 percent of the time, this a lot less frequent than during any other season. W through N winds often bring poor visibilities to this area. Fog and haze are encountered 8 to 15 percent of the time. Fog drops visibilities below 0.5 mile on about 2 to 5 days per month and is most frequent from midsummer on.

S of Point Arguello, weather is fair. Visibilities are usually better than 5 miles, winds and seas are calmer, but temperatures are cool. These offshore waters are almost always under the influence of a high. W through NW winds, which blow 70 to 75 percent of the time, keep temperatures mostly in the sixties and bring haze and fog about 15 percent of the time. These warm, moist winds blowing over the California Current also help keep the sky overcast or obscured almost one-half of the time. Skies are clear about one-quarter of the time. Gales are rare, as are rough seas. Winds blow at about 10 knots.

The subtropical high-pressure system forces most tropical storms S of southern California. There is a threat of tropical cyclones from June through November. An average tropical cyclone season sees about 15 tropical cyclones (winds of about 34 knots), of which an average of 7 reach hurricane strength. These storms seldom move N of 30°N. They are most likely to reach the latitudes of 30° to 35°N in August or September. However, by this time, they are usually weak and either well out to sea or well inland over Arizona. The eastern North Pacific season peaks in July, August, and September. About three to five tropical cyclones can be expected each month, with an average of one to two reaching hurricane strength. The last damaging tropical cyclone to affect southern California was the September 1939 storm which moved inland near Los Angeles. In September 1972, the remains of a hurricane moved inland between San Diego and Los Angeles; it carried only 20-knot winds at the time of landfall.

Fall arrives subtly in September N of Point Arguello. It is delayed a month or so to the S by the subtropical high. High-pressure systems still bring some sunny, mild days with light W through N winds off Oregon and Washington, but even on these days, swells from distant storms often cast an ominous mood over these waters. Some storms move close enough to generate a SE through SW flow off Oregon and Washington. They also bring rain to offshore Washington waters about 8 to 13 percent of the time. A tightening of pressure gradients, off northern California and Oregon in September, is responsible for gales on 2 to 5 days, and for seas of 12 feet or more, 2 to 4 percent of the time. Meanwhile, off central California, gales blow less often and seas are calmer than they were last month. September is usually the driest month in offshore waters from Oregon southward. Precipitation frequencies range from 6 percent off Oregon to less than 1 percent off southern California. Poor visibilities continue to plague the offshore waters N of Point Arguello. Fog reduces visibilities to less than 0.5 mile on about 4 to 6 days in September. September temperatures usually range from the upper fifties and low sixties in the N, to the mid and upper sixties off southern California.

During October and particularly November, storms become more frequent, more intense, and move closer to the area than those of summer and early autumn. As the subtropical high weakens and retreats S, these storms move to the NW and N, most affecting the vulnerable waters off Washington and Oregon. They frequently sweep these seas with strong SE through SW winds, which carry rain and sometimes fog. These winds average 15 to 20 knots. Gales occur on about 2 to 4 days in October and 3 to 6 days in November, off Washington and Oregon. Strong winds whip up seas of 12 feet or more about 10 to 16 percent of the time. Rain falls more often as fall progresses. It occurs about 8 to 20 percent of the time in October, increasing to 16 to 30 percent by November in these N seas. This is about as much as it rains in any month. Fog continues to plague this area, and often rides in on a strong, warm S flow that accompanies a low-pressure system. It reduces visibilities to below 0.5 mile on about 2 to 5 days per month. Temperatures of Washington and Oregon are often in the fifties in October and midforties to midfifties the following month.

The winter transition comes later to California offshore waters. High-pressure systems remain influential, so winds often blow out of the N and NW through late autumn, particularly in the S. Even off northern California, winds out of the N are only slightly less frequent than southerlies as late as November. Storms move closer and occasionally break through the protective barrier in November. In offshore northern California waters, they are responsible for about 3 to 5 gale days per month, and for seas of 12 feet or more, 6 to 10 percent of the time. They also dump rain up to 10 percent of the time. Weather generally improves to the S, where rain falls as little as 3 percent of the time. Gales occur on about 2 days or less. Seas of 12 feet or more occur about 8 percent of the time in central waters, and about 1 percent in the S. Temperatures change slowly over offshore waters. In October, they frequently run in the fifties in the N, and in the sixties to the S. Temperatures drop just a few degrees in November.

Fog continues to be the most frequent navigational weather hazards in the waters of offshore northern and central California. Fog reduces visibilities to below 0.5 mile on about 5 to 7 days during October, the worst month. Fog and haze are reported about 15 to 20 percent of the time, except off Los Angeles, where they occur about 40 percent of the time.

Routes.-The route along the California-Oregon-Washington coast frequently must be navigated in thick weather. Most of the courses are long, and the effect of currents is uncertain.

San Diego to Strait of Juan de Fuca.-Vessels can proceed on rhumb lines through the following positions:

32°37′N., 117°16′W.; off San Diego.

Thence to the Traffic Separation Scheme off San Pedro Bay, then follow the Traffic Separation Scheme between Point Fermin and Point Conception.

34°33′N., 120°42′W.; off Point Arguello.

37°38′N., 123°12′W.; off Farallon Islands (San Francisco).

38°55′N., 123°50′W.; off Point Arena.

40°26'N., 124°32'W.; off Blunts Reef.
42°50'N., 124°44'W.; off Cape Blanco.
46°11'N., 124°12'W.; off Columbia River.
48°10'N., 124°52'W.; off Umatilla Reef.
48°26'N., 124°47'W.; off Cape Flattery.

Caution: Route W of Farallon Islands crosses San Francisco-Honolulu and other Pacific courses of vessels using the San Francisco Traffic Separation Scheme.

San Diego to San Francisco.–Vessels can follow San Diego-Strait of Juan de Fuca route to position off Point Arguello, thence rhumb lines through the following positions:

36°17'N., 121°57'W.; off Point Sur.
37°10'N., 122°26'W.; off Pigeon Point.

Thence by prescribed San Francisco Traffic Separation Scheme route to vicinity of San Francisco Approach Lighted Horn Buoy SF.

San Francisco to Strait of Juan de Fuca.–Follow prescribed San Francisco Traffic Separation Scheme route to a position off Point Reyes, thence to Point Arena and other positions on the San Diego-Strait of Juan de Fuca route.

Caution.–Strict adherence to tracks through positions listed above could result in collision of meeting vessels. It is suggested that southbound vessels shape courses through positions a mile farther off the mainland.

San Diego to Panama.–Proceed on rhumb lines through the following positions:

32°38'N., 117°13'W.
28°00'N., 116°00'W.
24°40'N., 112°30'W.
20°00'N., 107°30'W.
7°05'N., 81°45'W.

San Diego to Honolulu.–Rhumb line from 32°37'N., 117°16'W., to 21°14'N., 157°39'W.

Los Angeles to Honolulu.–Follow the Traffic Separation Scheme route through the Gulf of Santa Catalina, thence proceed on rhumb lines through the following positions:

32°48'N., 118°16'W.
21°14'N., 157°39'W.

San Francisco to Honolulu.–Follow prescribed San Francisco Traffic Separation Scheme route to a position S of Farallon Islands, thence rhumb line to 21°14'N., 157°39'W.

Strait of Juan de Fuca to Honolulu.–Great circle from 48°26'N., 124°47'W., to 21°14'N., 157°39'W.

Strait of Juan de Fuca to Unimak Pass.–Great circle from 48°31'N., 125°00'W., to 54°00'N., 163°00'W.; thence on rhumb line to 54°20'N., 164°45'W.

Principal ports.–The principal deep-draft commercial ports within the area of this Coast Pilot are: San Diego, Long Beach, Los Angeles, San Francisco, Oakland, Richmond, Stockton, Humboldt Bay, Coos Bay, Portland, Vancouver, Grays Harbor, Seattle, and Tacoma.

Other ports are Port Hueneme, Port San Luis, Redwood City, Sacramento, Astoria, Longview, Port Angeles, Anacortes, Bellingham, and Olympia.

Pilotage.–In the area covered by this Coast Pilot, pilotage, with a few exceptions, is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. It is optional for U.S. vessels in the coastwise trade, provided they are under the control and direction of a pilot duly licensed by Federal law for the waters which that vessel travels.

Only at San Francisco do pilot boats cruise on station continuously. At the other ports the pilots must be notified in advance in order for the pilot boat to meet the vessel at the proper time. Most of the pilot boats and stations may be contacted by radio; though ships' agents normally arrange for pilots, a vessel may notify the pilot station of its estimated time of arrival by radio. Specific information is given in the description of the various ports.

Towage.–Tugs of various sizes are available at all the deep-draft ports. Arrangements for their use are usually made by the ship's agent, but in some cases may be made from the vessel by radio. For further information, refer to the description of the port.

Vessel Arrival Inspections.–Quarantine, customs, immigration, and agricultural quarantine officials are stationed in most major U.S. ports. (See appendix for addresses.) Vessels subject to such inspections generally make arrangements in advance through ships' agents. Unless otherwise directed, officials usually board vessels at their berths.

Harbormasters and wharfingers are mentioned in the text when applicable. They generally have charge of the anchorage and berthing of vessels.

Supplies of all kinds are available at San Diego, Los Angeles, Long Beach, San Francisco Bay, Portland, Seattle, and Tacoma. Limited quantites can be obtained at many other ports.

Repairs.–Large ocean-going vessels may be drydocked for complete repairs at Los Angeles, Long Beach, San Francisco Bay, Portland, and Seattle. Smaller ships of up to about 7,000 tons may also be drydocked at San Diego. Fishing boats and yachts can be hauled out and can have hulls and engines repaired at numerous other places. The Coast Pilot gives information on many of these facilities; usually the largest repair facility in each area is mentioned. Additional information may be obtained from the series of small-craft charts published for many places.

Salvage equipment is available at Los Angeles, San Francisco Bay, Portland, and Seattle.

Small-craft facilities.–There are numerous places where fuel, supplies, protected berths, repairs, and shore facilities are available for small craft. For isolated places and small cities, the Coast Pilot describes the more important of these facilities; for large port areas, where individual facilities are too numerous to mention, the information given is more general. Additional information may be obtained from the series of small-craft charts published for the many places, and from various local small-craft guides.

A vessel of less than 65.6 feet (20 meters) in

length or a sailing vessel shall not impede the passage of a vessel that can safely navigate only within a narrow channel or fairway. (Navigation Rules, International-Inland Rule 9(b).)

Southern California has many small-craft harbors with excellent facilities, but N of San Francisco the distances between protected harbors having facilities increases considerably until in the Puget Sound area. Temporary moorage is usually available for transients at most of the harbors. The intense yachting activity of California as far N as San Francisco, however, makes transient moorage more difficult along this section of the coast, even with its numerous harbors built especially for such craft.

Standard time.–California, Oregon, and Washington use Pacific standard time, which is 8 hours slow of Greenwich mean time. Example: When it is 1000 at Greenwich, it is 0200 in the three coastal States. Hawaii uses Alaska-Hawaii standard time, which is 10 hours slow of Greenwich mean time. Example: When it is 1000 at Greenwich, it is 0000 in Hawaii.

Daylight saving time.–In California, Oregon, and Washington, clocks are advanced 1 hour on the last Sunday in April and are set back to standard time on the last Sunday in October. Daylight saving time is not observed in the State of Hawaii.

Legal public holidays.–The following are legal holidays in the area covered by this Coast Pilot: New Year's Day, January 1; Washington's Birthday, third Monday in February; Memorial Day, last Monday in May; Independence Day, July 4; Labor Day, first Monday in September; Columbus Day, second Monday in October; Veterans Day, November 11; Thanksgiving Day, fourth Thursday in November; and Christmas Day, December 25. The national holidays are observed by employees of the Federal Government and the District of Columbia, and may not be observed by all the States in every case.

In addition, the following holidays are also observed in the area covered by this Coast Pilot: Lincoln's Birthday, February 12, in California and Washington, first Monday in February, in Oregon; Presidents Day, first Monday in February, in Hawaii; Kuhio Day, March 26, in Hawaii; Good Friday, in Hawaii, in California from 1200 to 1500; Kamehameha Day, June 11, in Hawaii; Admission Day, third Friday in August, in Hawaii; Admission Day, September 9, in California; General Election Day, first Tuesday after first Monday in November, in California and Washington.

4. SAN DIEGO TO POINT ARGUELLO, CALIFORNIA

This chapter describes the 240-mile irregular coast of southern California from the Mexican border to Point Arguello. The coast extends in a general NW direction and includes the major ports of San Diego, Long Beach, Los Angeles, and Port Hueneme. This chapter also describes the recreational and fishing ports of Oceanside, Newport Beach, Ventura, Santa Barbara, and the many other recreational boating ports on San Pedro and Santa Monica Bays and along the Santa Barbara Channel.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1110 through 80.1165, chapter 2.

Chart 18022.–There are several islands and dangers from 7 to 100 miles off the southern California coast; they are described in chapter 5.

Many restricted and danger areas are in these waters. (See chapter 2 for limits and regulations.) In addition, missile firing, gunnery, and bombing operations are conducted on and over offshore waters not included in the areas defined in chapter 2, and at times endanger surface vessels. Information about these areas is published in Local Notice to Mariners issued by Commander, Eleventh Coast Guard District, Long Beach, Calif.; and Daily Memorandum, Pacific Edition, and Weekly Notice to Mariners issued by Defense Mapping Agency Hydrographic/Topographic Center, Washington, D.C.

Vessels are requested not to tow submerged objects across charted submarine transit lanes in use off the coast of southern California; times of transit are published in the Local Notice to Mariners.

Weather.–The mild climate from San Diego to Point Arguello is controlled by the Pacific high-pressure system. Aided by the sea breeze, it brings winds from off the water, mainly S through N, which help keep coastal temperatures up in winter and down in summer. Coldest average winter temperatures range from the middle to upper fifties, while summertime readings are most often in the sixties. Occasionally a hot dry flow off the land in autumn will cause temperatures to soar into the nineties, and a rare winter outbreak from the E can drop temperatures to below freezing. Winter is the rainy season, although not much rain falls along these coasts.

Strong winds and rough seas, while less frequent than farther N, can be a problem from the middle of fall through late spring. Strong pressure gradients, distant storms, and infrequent close storms account for most of the gales and seas of 12 feet or more, particularly off Point Arguello and in the Santa Barbara Channel. Strong local winds (Santa Ana) also generate gales along sections of this coast.

Two types of fog confront the mariner in these waters. Advection or sea fog, which is caused by warm, moist air flowing over cool water, is a widespread, persistent problem N of Los Angeles, particularly during summer and fall. Radiation fog forms over land at night and drifts out to sea up to 50 miles. It usually lifts by afternoon and is local by nature. This fog is a problem during fall and winter, particularly S of Santa Monica.

Charts 18740, 18765.–In clear weather, vessels coming from S will sight Table Mountain, and its surrounding high land, and Los Coronados before picking up the San Diego landmarks.

Table Mountain (chart 18022), conspicuous and flat-topped, is in Mexican territory, 25 miles SE of Point Loma and 6 miles inland.

Los Coronados (Coronado Islands) are four bare, rocky islands, extending 4.5 miles in a NW direction, 7 miles offshore in Mexican waters, and 15 miles S of Point Loma. These islands are prominent in clear weather, and the passage E of them is commonly used by vessels. Depths in the vicinity of the islands are irregular, and in thick weather or at night caution must be observed when near them.

A light is shown from a white cylindrical masonry tower on the S end of the S island; it is obscured from certain directions by the N islands. Another light is shown from a white square masonry tower near the N end of the S island; local fog sometimes obscures it.

The boundary between the United States and Mexico is marked by a 14-foot white marble obelisk on a pedestal 41 feet above the water near the edge of a low table bluff. The visible marker is 200 yards from the beach and 10 miles 142° from Point Loma Light. A large circular concrete bull ring is conspicuous just S of the marker. A stone mound, 365 feet above the water and 1 mile E of the obelisk, marks another point on the boundary line. Directly N of the obelisk the mesa falls to the low marshy land S of San Diego Bay.

About 1.5 miles N of the border at Imperial Beach is a fishing pier extending 400 yards to seaward.

In the approach from seaward in clear weather, San Clemente Island, the southernmost of the offlying islands, will be sighted before the distinguishing features of the coast are seen. This will check the vessel's position and indicate subsequent shaping of the course for Point Loma. Upon a nearer approach, Cuyamaca Peak and the high land of the interior, Los Coronados, and Point Loma will be distinguished. Several aerolights in the vicinity of San Diego are visible from seaward.

When making the approach to San Diego, useful radar targets are San Clemente Island, Los Coronados, the pleasure piers at Imperial Beach and Ocean Beach, the jetties of Mission Bay, the offshore oceanographic tower at Mission Beach, Point Loma, and Ballast Point.

When entering the harbor, Buoy 5 and Ballast Point are easily identified targets, thence Shelter Island, the radar reflector on North Island, and the various piers on either side of the channel; thence Harbor Island, the Coast Guard station pier, B-Street Pier, and the Tenth Avenue Marine Terminal.

Charts 18773, 18772.–San Diego Bay, where California's maritime history began in 1542, is 10 miles NW of the Mexican boundary. In September of that year, Juan Rodriquez Cabrillo, the Spanish explorer, sailed his frail bark into the bay. The bay is considered one of the finest natural harbors in the world, and affords excellent protection in any weather; it is free of excessive tidal current movements. A low, narrow sandspit, which expands to a width of 1.6 miles at North Island on its NW end, separates the bay from the ocean.

The waters off the entrance to San Diego Bay are included in a **restricted area.** (See 207.612a and 207.612b, chapter 2, for limits and regulations.)

The city of **San Diego** is on the NE shore of the bay. **Coronado** is on the sandspit opposite San Diego. **National City** and **Chula Vista** are S of San Diego on the SE shore of the bay. The principal wharves are at San Diego and National City. Coronado, connected to San Diego by a highway bridge, is a residential and resort area of little commercial importance.

Prominent features.–Point Loma, on the W side of the entrance to San Diego Bay, is a ridged peninsula with heights of about 400 feet. The ridge is bare of trees except in the gullies and where planted around the houses near the summit, and is sparsely covered with grass, sagebrush, and cactus. The tanks and buildings of a sewage treatment plant are conspicuous about 0.9 mile N of the point. At a distance the point usually has the appearance of an island. **Point Loma Light** (32°39.9'N., 117°14.5'W.), 88 feet above the water, is shown from a black house on a 70-foot white square pyramidal skeleton tower at the S end of the point. The station has a radiobeacon, fog signal, and a special radio direction-finder calibration station. (See Light List for details.) Thick kelp beds extend more than 1.5 miles S of the point, and a sunken wreck is about 0.5 mile S of the point.

On the nearer approach, the abandoned lighthouse will be seen on the highest part of the hill immediately back of Point Loma Light. The old lighthouse and grounds form the **Cabrillo National Monument,** honoring the discoverer of San Diego Bay. The statue of Cabrillo, about 300 yards NE of the abandoned lighthouse, is reported to be an excellent mark when fog obscures the old lighthouse. From inside the bay, the white cylindrical base of a dismantled radiotelescope is prominent 1.5 miles N of Point Loma Light. A small radiotelescope is just W of the cylindrical base, but is less prominent from the bay. Other prominent objects along the crest of the ridge are a large red and white checkered elevated tank, a standpipe, and a tall lookout tower all about 2.5 miles N from the light.

North Island, the filled NW end of the sandspit on the E side of the bay entrance, is the U.S. Naval Air Station, San Diego. On its SE side is the city of Coronado. Prominent features that show up well from the entrance are the tall condominiums at Coronado Shores 2.7 miles E of the entrance, the S tower of Hotel del Coronado 2.4 miles E of the entrance, and the tower of the Naval Air Station Administration Building, which is surmounted by an aerolight and is operated intermittently with varying characteristics. In clear weather the skyline of the city of San Diego is very prominent on the S approach.

A **018°49'–198°49' measured nautical mile** has been established off the W side of North Island; the markers are on shore.

Ballast Point, low and sandy, projects 0.4 mile NE from the E side of Point Loma, 1.3 miles N from Point Loma Light. **Ballast Point Light B** (32°41.2'N., 117°13.9'W.), 16 feet above the water, is shown from a dolphin with a green and white diamond-shaped daymark off the end of the point; the station has a fog signal. A long pier of the Navy submarine facility is 0.2 mile NNW of Ballast Point. A private fog signal is on the pier.

Storm warning signals are displayed. (See chart.)

A jetty extends 1 mile S on **Zuniga Shoal** from **Zuniga Point,** the SW extremity of North Island. The outer two-thirds of the jetty has only small sections visible at high water; the submerged jetty is marked by lights and by a light and fog signal at its seaward end.

Restricted areas of a degaussing station are between Ballast Point and Zuniga Point, and N of Ballast Point. (See 207.612 (b), (c), and (d), chapter 2, for limits and regulations.)

A submerged jetty extends about 220 yards W from Zuniga Point.

In 1976, a rock awash was reported about 80 yards NW of the northernmost degaussing platform on the W side of North Island.

A **safety zone** is off the SE side of the Coast Guard station E of Harbor Island on the N side of the bay. (See 165.01 through 165.25 and 165.1101, chapter 2, for limits and regulations.)

COLREGS Demarcation Lines.–The lines established for San Diego Harbor are described in 80.1110, chapter 2.

Channels.–A Federal project provides for depths of 42 feet through the entrance to the turning basin on the NE side of North Island, thence 35 feet from the turning basin to the South Bay turning basin. (See Notice to Mariners and latest editions of the charts for controlling depths.)

From S of the 24th Street Marine Terminal, depths of 20 feet shoaling to 7½ feet are in the buoyed channel leading to Chula Vista in South San Diego Bay.

Anchorages.–General anchorages, special anchorages, and anchorages for Government vessels and nonanchorage areas have been established in San Diego Bay. (See 110.1, 110.90, and 110.210, chapter 2, for limits and regulations.)

Vessels awaiting outside the entrance for a pilot will find good anchorage in 36 feet or more SE of the entrance to the channel, although permission to anchor in the restricted area must be obtained from the local naval authorities. The area in the lee of Point Loma, S of Ballast Point and W of the E line of the project channel, is reserved for pilot boats and harbor patrol or U.S. Government craft. (See 207.612a, chapter 2, for limits and regulations.) All of the numbered mooring buoys in the bay are for use by the U.S. Navy.

Bridges.–A fixed highway bridge linking San Diego and Coronado crosses San Diego Bay 0.3 mile S of the Tenth Avenue Marine Terminal. The bridge has a clearance of 195 feet for a width of 600 feet over the two middle channel openings, 175 feet for a width of 500 feet for the opening just W of the San Diego piers, and 156 feet for a width of 194 feet in the opening adjacent to Glorietta Bay.

Tides.–The mean range of tide is 4.1 feet at San Diego, and the diurnal range of tide is 5.7 feet. A range of about 8 feet may occur at the time of maximum tides. Daily predictions are given in the Tide Tables.

Currents.–The currents set generally in the direction of the channels. In the vicinity of the entrance the usual velocity varies from 0.5 to 3 knots depending upon the stage of the tide. S of the end of the jetty there is a slight set toward Zuniga Shoal on the ebb. Great care should be taken while passing Ballast Point as a vessel may take a sudden sheer because of a crosscurrent deflected from Ballast Point.

The eddy usually encountered along the ends of the municipal piers makes docking difficult. The velocity and direction of the eddy are irregular, and the greatest care must be exercised by even the most experienced. Strangers should not attempt to dock large vessels without a pilot. (See the Tidal Current Tables for daily predictions.)

Weather.–In the San Diego Bay area, visibilities are reduced to less than 0.5 mile, mostly by radiation fog, on about 3 to 7 days per month from September through April. December is the foggiest month. This fog is worst during the late night and early morning hours. Dense fog is as frequent at North Island as it is at Imperial Beach. However, fog signals indicate that in general it is foggier around the entrance to the bay than it is in the N sections. For example, in December, the fog signal at Point Loma is operating about 20 percent of the time, compared to 10 percent at Ballast Point.

Winds in the area are strongest from November through April, when they blow 17 knots or more about 2 percent of the time. Gales are rare. Wind gusts have reached 50 knots or more during this season Strong winds often have a S component, but they also blow from the W and E. Winds along the coast are often affected by local topography, particularly when the flow is off the land. For example, at Imperial Beach, E winds blow 15 to 20 percent of the time from November through March. At Lindbergh Field Municipal Airport, prevailing winds are out of the N through NE during this period. W through NW winds are also common at both places. They become increasingly more frequent by March. During the late spring and summer, S through NW winds prevail at both locations. However, at the more exposed Imperial Beach, W winds occur up to 25 percent of the time, whereas the flow is more variable at San Diego. By October, the winter wind regime begins to reestablish itself.

The National Weather Service maintains an office at Lindbergh Field Municipal Airport; barometers may be compared there or by telephone.

(See page T-1 for **San Diego climatological table.**)

Pilotage.–All foreign vessels and vessels from a foreign port or bound thereto, and all vessels over 300 gross tons sailing under register between the port of San Diego and any other U.S. port, are liable for pilotage charges.

Vessels sailing under enrollment and licensed, and engaged in the coasting trade, between the port of San Diego and other U.S. ports, are exempt from all pilotage, unless a pilot is actually employed.

San Diego Bay is served by the Port of San Diego Pilots, Inc., which maintains an office at the Tenth Avenue Marine Terminal. The pilot boat is stationed at Shelter Island. The pilot office and boat monitor VHF-FM channel 16 (156.80 MHz) and use VHF-FM channel 12 (156.60 MHz) as a working frequency. The 52-foot pilot boat is white with the word PILOT on both sides of the deckhouse. The boat displays the International Code flag "H". At night, a flashing white light is shown when a vessel approaches. Arrangements for pilots are made by telephone (714–233–7814) or by calling "Pilot San Diego" by radio; the pilots request the incoming vessel's estimated time of arrival and draft. A 2-hour advance notice is required if any changes occur.

Pilots board vessels in the vicinity of San Diego Bay Approach Lighted Whistle Buoy 1 (32°37.3'N., 117°14.7'W.). When boarding, pilots request vessels maintain a speed not to exceed 5 knots and rig the pilot ladder about 3 feet above the water on the starboard side.

The San Diego Unified Port District operates a VHF-FM radio station from Harbor Control Headquarters at Shelter Island for contacting merchant ships, port pilots, and other nearby stations. Channel 16 (156.80 MHz) is for distress, urgent, and safety messages, and for calling; channel 12 (156.60 MHz) is for port operations; and channel 11 (156.55 MHz) is for commercial communications. The station call sign is KJC-824.

Towage.–Tugs up to 2,000 hp are available from commercial operators in the San Diego area. Naval tugs handle navy vessels, but will assist commercial vessels in emergencies.

San Diego is a **customs port of entry.**

Quarantine, customs, immigration, and agriculture quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.) Pleasure craft and yachts subject to such inspections can make arrangements through the harbor police at Shelter Island. Officials usually board documented vessels at their berths. Small commercial vessels and fishing boats are boarded at the Broadway Pier. Pleasure craft are boarded at the police berth at Shelter Island.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard.–A **Marine Safety Office** is just E of Harbor Island. (See appendix for address.)

Harbor regulations.–The Port of San Diego is under control of the San Diego Unified Port District. Rules and regulations are enforced by a Port Director, who is appointed by the Board of Port Commissioners. The general offices of the port district are at 3165 Pacific Highway, San Diego. The manager of marine operations and the chief wharfinger have offices at the Tenth Avenue Marine Terminal.

Storm warning signals are displayed. (See chart.)

Wharves.–The **San Diego Unified Port District** owns the deepwater commercial facilities in the bay and operates them either independently or in conjunction with private firms. The port piers and wharves have rail and highway connections, water, and electric shore power. There are a number of smaller privately operated wharves and piers used for receiving oil, repairing vessels, and for mooring and fueling small craft. Only the deep-draft commercial facilities are described. The alongside depths given for each facility described are reported depths. (For information on latest depths, contact the Port of San Diego.) For a complete description of the port facilities, refer to Port Series No. 27, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. Mobile cranes up to 165 tons and floating cranes up to 75 tons are available.

In the port area, the San Diego Unified Port District and private companies operate warehouses having a total of more than 595,000 square feet of dry storage space and more than 1,680,000 cubic feet of cold storage space. A large amount of transit shed space and open storage is available.

B Street Pier (32°43'02"N., 117°10'28"W.): 400-foot face, 37 to 35 feet alongside; 1,000-foot N and S sides, 37 to 35 feet alongside; deck height, 13 feet; two transit sheds, 244,000 square feet of covered storage; receipt of general cargo.

Broadway Pier, S of B Street Pier: 135-foot face, 35 feet alongside; 1,000-foot N and S sides, 35 feet alongside; deck height, 13 feet; berthing passenger and cruise ships, mooring of tuna seiners.

Navy Pier, S of Broadway Pier: owned and operated by the Naval Supply Center.

Tenth Avenue Marine Terminal, Berths 1 and 2: concrete bulkhead, 1,118 feet of berthing space; 27 feet alongside Berth 1, 35 feet alongside Berth 2; deck height, 12 feet; pipelines extend from wharf to molasses and petroleum storage tanks in rear; receipt and shipment of general and containerized cargo; receipt of petroleum products and molasses; bunkering vessels.

Tenth Avenue Marine Terminal, Berths 3-6: concrete bulkhead, 2,500 feet of berthing space; Berths 3, 4, and 4A, 37 feet alongside, Berths 5 and 6, 35 feet alongside; deck height, 12 feet; 789,000 square feet of covered storage; 8 acres open storage area; pipeline extends from each berth to molasses storage tanks in rear; bunker fuel is piped to each berth; receipt and shipment of general and containerized cargo, receipt and shipment of molasses.

Tenth Avenue Marine Terminal, Bulk Handling Wharf Berths 7 and 8: 920 feet of berthing space, 35 feet alongside Berth 7, 36 to 21 feet alongside E end of Berth 8; deck height, 13 feet; bulk loader with a maximum loading capacity of 1,200 tons per hour; bulk loader includes a rotating car dumper and an unloader pit which accommodates four cars simultaneously; cargo is transferred by conveyor to a mobile loader which travels along the bulk berths; bulk storage in 12 silos, with 13,600-ton capacity; bunker fuel is piped to each berth.

National City Marine Terminal (24th Street Terminal), North Wharf; concrete bulkhead, 1,400 feet long, 20 to 35 feet alongside; deck height, 13 feet; loading tower with 50-foot boom; over 142,000 square feet of covered storage, open storage for 30,000 tons scrap metal; shipment of scrap metal, receipt of fuel oil.

National City Marine Terminal (24th Street Terminal), West Wharf: concrete bulkhead, 1,000 feet of berthing space, 35 to 37 feet alongside; deck height, 13 feet; one 40-ton traveling container crane; 17-acre container marshalling area; receipt and shipment of containerized cargo.

National City Marine Terminal (24th Street Terminal), South Wharf: concrete bulkhead, 1,500 feet of berthing space, 35 to 37 feet alongside; deck height, 13 feet; two roller conveyors; ample open storage area for handling lumber; receipt and shipment of general cargo; shipment of lumber.

Supplies.–Marine supplies of all kinds are available in San Diego. Bunker fuel, diesel oil, and lubricants are available. Large vessels can be bunkered at the Tenth Avenue Marine Terminal, or arrangements can be made to fuel from barges. Water is available at most of the berths.

Repairs.–There are shipbuilding and repair yards in San Diego with floating drydocks, the largest of which has a lifting capacity of 3,100 tons. The largest marine railway can handle craft up to 1,400 tons. Complete shipyard facilities are available for all types of repair work.

A U.S. Navy graving dock, located at the naval station near the foot of 32nd Street, may be used by local repair firms by prior arrangements with the San Diego Unified Port District and local naval authorities. The dock has a clear inside length of 693 feet and an entrance width of 90 feet.

The dock is served by one 20-and one 30-ton traveling revolving gantry crane. The graving dock at National Steel and Shipbuilding Co., about 0.9 mile NW of the Navy graving dock, has a clear length of 998 feet and an entrance width of 176 feet.

Communications.–San Diego has transcontinental railroad connections to the N and E, and is served by three major highways. Interstate Route 5 leads N along the coast, Interstate Route 15 leads NE to the interior, and U.S. Route 80 leads E. Major airline service is available at Lindbergh Field Municipal Airport. San Diego is the port of call for many steamship lines. Major bus and railroad, and motor freight lines serve the city.

Small-craft facilities.–**Shelter Island,** across the channel from North Island and 1.5 miles above Ballast Point, includes the **Shelter Island Yacht Basin** on the S and the **Commercial Basin** on the N. Shelter Island is the most important small-boat area in San Diego Bay. The yacht basin has several large marinas and yacht clubs. It can accommodate more than 1,945 boats at its piers, floats, and moorings. The entrance channel has depths of 20 feet to inside the entrance, thence 15 feet to most of the facilities; the least depth is 9 feet. The **harbor police** are at the Harbor Control Headquarters just inside the entrance to the yacht basin. The police dock is also the boarding station for the inspection of small craft by Customs, Public Health, Immigration and Agricultural quarantine personnel when such inspections are necessary. Harbor police boats, providing fire protection, law enforcement, and assistance to small boats in distress, operate from this facility on a 24-hour basis. Overnight berths for transient vessels are usually available at one of the marinas; if no such berth is available, temporary mooring or berthing may be made available through the harbor police. The Commercial Basin has accommodations for over 800 vessels and is the home port for many commercial fishing vessels. Repair yards in the basin have marine railways that can handle craft up to 800 tons. All kinds of repairs to small vessels may be obtained here. Both the yacht basin and the Commercial Basin have fueling docks, a launching ramp, and marine supplies.

Storm warning signals are displayed. (See chart.)

Harbor Island, about 0.5 mile NE of Shelter Island, is in the northernmost part of the bay. **Harbor Island West Basin** has berthing and mooring accommodations for nearly 1,600 craft. A number of marinas, hotels, restaurants, and shops are along the shore of the basin. A light shows from atop a building near the W end of the island.

Glorietta Bay, on the S side of Coronado and 6 miles from Ballast Point, is a small-craft harbor occupied by a yacht club and a small marina. The facilities include berths for over 215 yachts and small craft. A channel marked by buoys, daymarks, and a 232° lighted range leads from the main channel in San Diego Bay to the basin in Glorietta Bay. In February 1981, the reported centerline controlling depth in the channel was 13 feet, thence depths of 8 to 10 feet were reported in the basin except for lesser depths along the edges. A 5 mph **speed limit** is enforced in Glorietta Bay. Gasoline, lubricants, ice, a launching ramp, and water are available.

Storm warning signals are displayed. (See chart.)

Chula Vista Small Boat Basin, under construction, is on the E side and near the head of South San Diego Bay at Chula Vista. In March 1981, the buoyed entrance channel to the basin was dredged to 10 feet. When completed, the basin will be protected at the entrance by a stone breakwater to the S and a wave attenuation pier to the N; both will be marked by lights. A small-boat launching ramp and trailer parking facilities will be available in the basin.

Chart 18740.–The 80-mile coast between San Diego Bay and San Pedro Bay is thickly settled, and the buildings of numerous towns and resorts are prominent from offshore. Several small-boat harbors and the port of Newport Bay are along the coast.

The first 11 miles of the coast, between Point Loma and Point La Jolla, is extremely rocky, and the kelp beds extend up to 2 miles from shore; vessels should stay well offshore.

About 1 mile N of Point Loma Light is a submerged sewer outfall line extending about 1 mile to the W.

Ocean Beach, 5 miles N of Point Loma, has a large Y-shaped fishing pier with a fog signal on the end.

Weather.–Over the Gulf of Santa Catalina and along its shores, fog is a problem during fall and winter. This is most often a land (radiation) fog that drifts out over the gulf at night. By late morning, conditions begin to clear, particularly along the coast. Offshore, fog reduces visibilities to less than 0.5 mile on about 4 to 9 days per month, from September through February and in May. September and October are the worst months. Along the coast, visibilities drop below 0.5 mile on about 2 to 8 days per month from August through April. November, December, and February are the worst months.

Gale force winds never occur as much as 1 percent of the time in the Gulf of Santa Catalina. They are infrequently encountered from November through April. Wind speeds of 17 knots or more occur about 1 to 3 percent of the time from December through May. Winds on the coast are often light. At Camp Pendleton, winds less than 3 knots occur 40 to 50 percent of the time from September through March. Seas are most likely to get choppy from November through April, when distant storms S of 40° N. generate W swells. These swells are 6 feet or more, about 2 to 5 percent of the time. In winter, they occasionally exceed 9 feet and some 12-foot swells have been reported.

Chart 18765.–**Mission Bay,** entered between two lighted jetties 5.5 miles N of Point Loma, is a recreational small-craft harbor administered by the city of San Diego. Prominent features when approaching the harbor are the municipal fishing pier at Ocean Beach, 0.3 mile S of the entrance, and the U.S. Navy oceanographic platform 1 mile NW of the entrance. The lighted 338-foot tower at Sea World is prominent 1.8 miles E of the entrance. Fog signals are sounded from the fishing pier and the navy platform, and a fog signal and radiobeacon are at the N entrance jetty. A dredged channel leads from deep water in the Pacific Ocean to the highway bridge about 1.3 miles above the entrance, **Quivira Basin** and **Mariners Basin,** on the E and W sides of the channel, respectively, are entered about 1 mile above the entrance. In March 1977, the controlling depth through the entrance was 14 feet (19 feet at midchannel); thence in 1973–1977, a reported controlling depth of 17 feet to the highway bridge and 20 feet in Quivira Basin. Depths of 14 to 19 feet are in Mariners Basin. The inner bay has depths of about 6 feet.

COLREGS Demarcation Lines.–The lines established for Mission Bay are described in 80.1115, chapter 2.

Two fixed highway bridges cross Mission Bay. The first, crossing above the entrance between Ventura Point and Sunset Point, has a clearance of 38 feet. The second, connecting Vacation Isle with Crown Point to the N and Dana Landing to the S, has a clearance of 29 feet over the N draw and a 46-foot span with a clearance of 24 feet over the S draw.

An aerial tramway cable, with a clearance of 42 feet, crosses the entrance to **Perez Cove,** immediately SE of Dana Landing.

The Mission Bay Aquatic Headquarters and Harbor Patrol are on the S side of the lighted entrance to **Quivira Basin.** Harbor regulations are enforced by the Harbor Patrol. The patrol makes safety inspections and provides limited fire protection services and patrol boats on a 24-hour basis. Water skiing, swimming, sailing, fishing, and speed regulations are enforced in Mission Bay. Most regulations are posted; complete regulations are available from the Aquatic Headquarters Office. Several mooring buoys, provided by the Aquatic Headquarters, are available in Quivira Basin on a 72-hour basis for the use of any vessel; there is no charge for mooring. (Contact the Aquatic Headquarters for assignment.) The largest repair yard in the bay is in Quivira Basin. A mobile lift here can handle craft up to 45 feet and 10 tons for engine and hull repairs; larger craft must go to San Diego for repairs. Gasoline, diesel fuel, water, ice, bottled gas, and marine supplies are available. There are numerous launching ramps and parking areas around the bay. The inner bay has several marinas and many private moorings.

The Harbor Patrol reports that moderate to heavy swells from the W outside the entrance tend to break just inside the entrance along the S jetty. Under these conditions, the entrance is dangerous and should be made by staying in the left quarter of the channel (near the N jetty). With a rough sea outside, a heavy surge exists inside the bay, especially in Quivira Basin. Boats must be securely moored to prevent damage from this surge condition.

Special anchorages are along the W side of Mission Bay in **San Juan Cove, Santa Barbara Cove, Bonita Cove,** Mariners Basin, and Quivira Basin. (See 110.91, chapter 2, for limits and regulations.)

Storm warning signals are displayed. (See chart.)

Mission Beach, 6.5 miles N of Point Loma, is an amusement place with prominent buildings. From seaward the highest part of the roller coaster looks like a dome. An oceanographic platform, marked by lights and a fog signal, is 0.8 mile offshore.

Pacific Beach, 8 miles N of Point Loma, has a pleasure pier extending about 260 yards from the beach.

A 2-mile rounding rocky point, 9 miles N of Point Loma, is the first high land N of San Diego Bay. The point is a spur from 822-foot **Soledad Mountain.** The S end of this headland is called **False Point,** and the N end is **Point La Jolla.** In the vicinity of Point La Jolla, rock cliffs with caves rise abruptly from the water to heights of 80 feet. The buildings at **La Jolla** and Pacific Beach, and the television towers on Soledad Mountain are prominent.

Scripps Institution of Oceanography, one of the leading institutions in research in oceanography and marine biology, has extensive facilities 12 miles N of Point Loma. The institution maintains a long pier for observation purposes. A **restricted area** extends seaward from this pier. (See 207.613, chapter 2, for limits and regulations.)

Just N of Scripps Institution the bluffs rise to a height of 300 feet, then decrease gradually for the next 5 miles to heights of 20 to 80 feet.

A **000°-180° measured nautical mile** has been established 13.5 miles N of Point Loma; each range is marked by two steel towers. A tall green standpipe is conspicuous just N of the shoreward marker of the S range.

Del Mar, 18 miles N of Point Loma, is a resort city.

The coast from Del Mar N for 31 miles to San Mateo Point is a low, flat tableland with abrupt cliffs 60 to 130 feet high and with broad beaches. The tableland is intersected by numerous deep valleys with streams that usually dry in the summer. In the N part, the high ridges of the interior are much nearer the coast. Paralleling this coast are U.S. Highway 101 and the Atchison, Topeka and Santa Fe Railway.

Charts 18740, 18774.–Carlsbad, 30 miles N of Point Loma, is a resort area with a number of hotels and motels. The stack of the San Diego Gas and Electric Co. near the S end of town is very prominent. The stack is marked by flashing white lights during the day and by fixed and flashing red lights at night. The company maintains a lighted bell buoy about 1 mile offshore and seven large mooring buoys in a semicircle about 400 yards E of it. Mariners are cautioned to pass W of the lighted bell buoy. Near the N edge of town the low white square tower on the W end of the San Diego Army and Navy Academy is distinctive.

The pleasure pier at **Oceanside**, 32.5 miles N of Point Loma, has a fish haven covered 10 feet around its seaward end. In 1976, it was reported that the pier had partially collapsed. Caution is advised.

Oceanside Harbor, at the N end of the city, 1.2 miles NW of the pleasure pier, is a small-craft harbor administered by the Oceanside Harbor District. The harbor, which can accommodate about 800 small craft, shares a common entrance with Del Mar Boat Basin (Camp Pendleton Marine Corps Base) to the N.

Prominent features when approaching the harbor include a large lighted sign reading "OCEANSIDE" in white letters on a blue background located on a grassy bluff overlooking the middle of the harbor, a long three-story apartment building on the beach of the S peninsula, a lighted tower on the SE side of the harbor resembling a lighthouse, and a boatel in the vicinity of the harbor entrance.

The common entrance to Oceanside Harbor and Del Mar Boat Basin is between two jetties each marked by lights. The long W jetty is marked by a single light at the seaward end, and the short E jetty is marked at both the seaward end and at the first bend by lights. A fog signal is sounded from the seaward end of the E jetty, and a radiobeacon is at the light at the first bend. Inside the common entrance is a junction buoy separating the Oceanside Harbor entrance channel and the Del Mar Boat Basin entrance channel. About 200 yards NE of the junction buoy is an orange and white special purpose buoy with the words "submerged jetty" written on it. This danger buoy gives warning to mariners of a submerged jetty close N of the Oceanside Harbor entrance channel. The inshore end of Oceanside Harbor entrance channel is marked by buoys on the N side, a light on the N side at the end of the riprap protecting the boatel, and a daybeacon on the inshore end of the jetty to the S.

COLREGS Demarcation Lines.–The lines established for Oceanside Harbor are described in 80.1120, chapter 2.

Channels.–A dredged channel leads from deep water through the entrance jetties, thence junctions E to Oceanside Harbor and N to Del Mar Boat Basin. In September 1981, the entrance channel and the channel leading to Oceanside Harbor had a controlling depth of 12 feet (19 feet at midchannel). Strangers should not attempt the entrance at night without assistance. Mariners are requested to contact the harbor patrol on VHF-FM channel 16 (156.80 MHz) before entering.

Harbor regulations.–The harbor is under control of the superintendent of the Oceanside Harbor District who has an office at the harbor headquarters building on the E side of the harbor opposite the entrance. About 35 berths for transient craft are available at the harbor headquarters dock. All moorage must be arranged with the Harbor District in the headquarters building. No slip reservations are accepted. The **Oceanside Harbor Patrol** operates from the headquarters building and has patrol boats that will assist vessels into the harbor on request. The patrol boats are equipped with rescue and fire fighting equipment. The patrol office monitors 2182 kHz and VHF-FM channels 12 (156.60 MHz) and 16 (156.80 MHz).

Weather.–Wind speeds at Oceanside rarely get above 28 knots; they are most likely to occur from December through April. Fog is sometimes a late night and early morning navigational hazard from August through March. During this period, visibilities drop below 0.5 mile on 2 to 8 days per month; November is usually the foggiest month. The worst time of day is between midnight and 0500.

Swells are most frequent from January through April.

Storm warning signals are displayed. (See chart.)

Coast Guard.–A Coast Guard search and rescue vessel is stationed at the dock on the W side of the harbor just S of the entrance.

Supplies.–Gasoline and diesel fuel are pumped at the fuel dock. Marine supplies, ice, and pumpout facilities are available.

Repairs.–A repair yard just N of the harbor district headquarters has a small floating drydock that can handle craft up to 50 feet and 25 tons. A mobile lift at the yard can handle craft up to 42 feet and 14 tons. Hull, engine, and electronic repairs are available.

Del Mar Boat Basin (Camp Pendleton), just N of Oceanside Harbor, is part of the U.S. Marine Corps reservation. (See 207.613b, chapter 2, for limits and regulations of the **restricted area.**) The boat basin shares a common entrance with Oceanside Harbor. In February 1974, the controlling depth was 12 feet in the channel to the basin. The channel is marked by buoys and daybeacons. A **restricted area** is off the outer breakwater. (See 207.613a, chapter 2, for limits and regulations.)

A **146°–326° measured course,** 5,280 feet long, has been established 1.6 miles NW of Del Mar Boat Basin. The ranges are marked by triangular-shaped daymarks on steel poles.

An elevated tank, 1.7 miles NE of the boat basin, is prominent from well offshore. The highway bridge and the trestlework of the railroad crossing of the **Santa Margarita River,** 1.7 miles W of the tank, also are prominent. A large white building nearly 7 miles NW of the boat basin is conspicuous from seaward.

San Onofre Mountain, 44 miles N of Point Loma and 1.5 miles inland, is the highest of the coastal range in the area.

San Mateo Point, locally known as **Cottons Point** and 47 miles NW of Point Loma, ends in cliffs 60 feet high and is the N head at the mouth of **San Mateo Creek.** Both San Mateo Creek and **Arroyo San Onofre,** a mile SE, are crossed by a trestlework. The large dome of a nuclear powerplant is 2.3 miles SE of San Mateo Point. A smaller dome-shaped building is on top of the bluff a few hundred yards SE.

San Mateo Point Light (33°23.2'N., 117°35.7'W.), 63 feet above the water, is shown from a pole on San Mateo Point.

Charts 18740, 18774, 18746, 18747.–From San Mateo Point to Dana Point, 7.5 miles NW, the land is higher and more rugged, and is broken by **San Juan Creek** about 1.5 miles E of Dana Point. The railroad and the highway run close together along the beach under the bluffs in this stretch of the coast to San Juan Creek, where the railroad turns inland.

San Clemente, 2 miles N of San Mateo Point, has many white houses with red-tiled roofs, making the place conspicuous from the sea. There is a small pleasure pier at the town; a fish haven covered 10 feet is off its seaward side.

Dana Point, 8 miles NW of San Mateo Point, is the seaward end of a high ridge. The spur forming the point ends in a moderately bold sandstone cliff 220 feet high with a precipitous broken face. Outlying rocks and ledges marked by a lighted whistle buoy extend offshore for 350 yards. **San Juan Rock,** 10 feet high and about 50 feet in extent, is 340 yards S of the highest point on the cliff, and a rock covered 2 fathoms is 2.4 miles SE of the point.

Storm warning signals are displayed. (See chart.)

Charts 18740, 18746, 18747.–Dana Point Harbor is a small-craft harbor in the lee of Dana Point. The harbor, administered by the Orange County Harbor, Beaches, and Parks District, is entered from the E between two breakwaters each marked by a light on the seaward end. A fog signal and radiobeacon are at the S light. A submerged sewer outfall line extends about 0.6 mile from shore, passing about 300 yards E of the S breakwater light. A rock, covered 7½ feet and marked by a buoy, is about 300 yards NE of the S breakwater light. When entering the harbor care should be taken to remain clear of these dangers, especially during low stages of the tide and/or periods of heavy SE swell.

Numerous uncharted private racing buoys are off the entrance to the harbor.

In September 1973, depths of 12 feet or more were reported in the approach with 8 to 12 feet inside the harbor. The harbor is protected from all sides.

The harbor has an E and W basin separated by a fixed highway bridge with a 45-foot channel span and a clearance of 20 feet. Berths in the E basin can accommodate over 1,400 vessels, and berths in the W basin can accommodate over 1,000 vessels. Shoaling to 5 feet in the entrance to the W basin was reported in June 1977. The shoals are marked by private buoys. A **dockmaster** assigns berths in the harbor. His office is at 24701 Dana Drive in the SE part of the E basin.

The Dana Point Harbor Patrol has an office in the most southeasterly building observed after passing through the breakwater. Patrol craft equipped with rescue and fire fighting equipment are stationed here. The patrol maintains a 24-hour radio watch on 2182 kHz and VHF-FM channels 12 (156.60 MHz) and 16 (156.80 MHz). Berths for about 25 transient craft are available at the harbor patrol office.

A **speed limit** of 5 mph is enforced in Dana Point Harbor. A swimming area, marked by private buoys, is in the NW corner of the harbor.

A **special anchorage** is in the W part of the harbor. (See 110.1 and 110.93, chapter 2, for limits and regulations.)

Storm warning signals are displayed. (See chart.)

COLREGS Demarcation Lines.–The lines established for Dana Point Harbor are described in 80.1125, chapter 2.

Supplies and **repairs.**–Most supplies and repairs are available at the marinas and service facilities at the harbor. (See the small-craft facilities tabulation on chart 18747 for latest listing of supplies and services available.)

San Juan Capistrano, a small town about 4 miles inland from Dana Point, is the site of the old mission founded in 1776. The grounds and the buildings have undergone extensive preservation, and services are held regularly in the chapel used by founding Father Junipero Serra. This mission is famous for the return of the swallows each March 19.

The 11.5-mile coast from Dana Point to Newport Bay is bold with rocky cliffs 40 to 100 feet high; these are the seaward ends of ridges separated by narrow, deep valleys. The community of **Laguna Beach** is midway along this stretch. A fishing and pleasure pier is at **South Laguna** about 2.9 miles NW of Dana Point.

Four private lighted buoys, about 4.1 miles SW of Laguna Beach, mark an area used to moor equipment and netting. Mariners should not attempt to pass between these buoys.

Santiago Peak, 17.5 miles NE of Dana Point and visible 80 miles, is the dominant feature of this part of the coast; the peak is double-headed and dark in contrast with the immediate coastal range.

Chart 18754.–Newport Bay, 64 miles NW of Point Loma, is an extensive lagoon bordered on the seaward side by a 3-mile sandspit. The bay is an important yachting and sport fishing center, and offers excellent anchorage for large yachts and small craft under all weather conditions. The city of **Newport Beach** embraces the districts of **Newport** and **Balboa,** on the sandspit, and **Corona Del Mar,** E of the entrance.

Prominent features.–The numerous houses and buildings along the beach and on the hills back of the bay are prominent from seaward. The tall office buildings at the Newport Center, 1.4 miles N of the harbor entrance, are the most conspicuous. The memorial hospital building, 0.3 mile N of the turning basin, and the light-colored concrete school buildings and tall tower on the high ground 1 mile back from the beach are also conspicuous.

The entrance to Newport Bay is between jetties 275 yards apart with lights at their outer ends. A fog signal and a radiobeacon are at the end of the W jetty. A lighted bell buoy is off the entrance.

A **111°37′-291°37′ measured nautical mile** is in San Pedro Channel, about 1.3 miles W of the entrance to Newport Bay. The E range is marked in front by a daymark on an 800-foot pleasure pier and in the rear by a daymark on shore at Balboa Beach. The W range is marked by daymarks on shore at Newport Beach. Another 950-foot pleasure pier is 2.8 miles NW of the W jetty.

COLREGS Demarcation Lines.-The lines established for Newport Bay are described in 80.1130, chapter 2.

Channels.-A Federal project provides for a 20-foot main channel from the entrance to a turning basin of the same depth NW of Lido Isle and a 10-foot Balboa Island North Channel extending N from the entrance along the E and N sides of Balboa Island. (See Local Notice to Mariners and latest editions of charts for controlling depths.) Elsewhere in the bay, depths are generally 10 to 20 feet.

Anchorages.-Special anchorages are in Newport Bay. (See 110.1, 110.95, and 110.212, chapter 2, for limits and regulations.) Assignments are made by the harbormaster. Depths are from 10 to 17 feet.

Dangers.-A **speed limit** of 5 m.p.h. in Newport Bay has been established by the Orange County Harbors, Beaches, and Park District. The upper reaches of the bay are extremely shoal and have been closed by the Health Department because of contamination. Two buoys in 33°37′23″N., 117°53′30″W. mark the downstream limit of the shoaling.

Bridges.-There are no bridges over the main channel. None of the bridges to the islands in the bay restrict passage to the anchorage areas.

Tides.-The mean range of tide is 3.7 feet at Newport Bay entrance, and the diurnal range of tide is 5.3 feet.

Weather.-Severe storms are rare. The Santa Ana is an exceptional wind that blows from the NE or E with great violence, although of short duration. (See Weather, Los Angeles, this chapter for discussion of Santa Ana winds.)

Storm warning signals are displayed. (See charts.)

Harbor regulations.-The Orange County Harbors, Beaches, and Parks District controls the movement and berthing of vessels under the direction of a harbormaster, who has an office on the E side of the bay about 0.8 miles from the entrance. Patrol and assistance craft operate from the harbor office on a 24-hour basis. The harbor office monitors 2182 kHz and VHF-FM channels 12 (156.60 MHz), 16 (156.80 MHz), and 73 (156.675 MHz). The patrol boats monitor 2182 kHz and VHF-FM channel 16 (156.80 MHz).

Coast Guard.-A search and rescue craft of the U.S. Coast Guard is stationed at the pier adjacent to the Harbor District Headquarters.

Wharves.-The numerous small wharves and landings in the bay are mostly for the use of local yachts and fishing craft. Five berths and several offshore moorings are available for transient craft at the Harbor District Headquarters pier. The harbormaster must be consulted before mooring. Five other transient berths are usually available at a marina at the NW end of the turning basin.

Supplies.-Fuel, water, and marine supplies are available at most of the facilities in the bay. (See the small-craft facilities tabulation on chart 18747 for the latest listing of supplies and services available.)

Repairs.-The largest marine railway in Newport Bay has a capacity of 325 tons and can handle craft up to 150 feet. Machine shops are available. Several shipyards can haul out small boats for general repairs.

Communications.-The city is served by State Route 1.

Charts 18746, 18747.-The 20-mile coast from Newport Bay to Point Fermin is low, and there are several lagoons near the beach. There are no trees near the shore; towns and resorts are almost continuous along the beach.

Huntington Beach State Park is a recreational area that extends 2 miles NW along the coast from the mouth of **Santa Ana River,** which is 4.5 miles NW of Newport Bay entrance. The trestle crossing the mouth of this river is conspicuous. A buoy marks the seaward end of a terminal structure of a water conduit extending from shore 1.4 miles NW of Santa Ana River. The twin stacks of the Southern California Edison Co. plant on shore and a spire about 1 mile back from the beach are conspicuous from any direction.

A submerged oil pipeline extends nearly 1.2 miles seaward, 2 miles NW of Santa Ana River; mooring buoys are off the end of the pipeline. A lighted buoy marks the seaward limit. **Huntington Beach,** a resort 5 miles NW of Newport Beach, is identified by its many oil derricks. The city has a fishing and pleasure pier which has a fish haven covered 10 feet around its seaward end. **Sunset Beach** is a small town 5 miles NW of Huntington Beach. An elevated tank is near the W extremity of the town.

Charts 18746, 18749.-**Anaheim Bay,** 14 miles NW of Newport Bay, is the site of the U.S. Naval Weapons Station. Waters inside the jetties are within a **danger zone**, and an **explosives anchorage** has been established E of the channel. (See 110.215 and 204.195, chapter 2, for limits and regulations.) In October 1978-July 1979, the controlling depths were 22 feet (31 feet at midchannel) from the entrance channel to the turning basin, thence 32 feet in the basin except for a 25-foot spot in the SE extension in about 33°44′01.5″N., 118°05′21.0″W. The channel is marked by lighted and unlighted buoys, lights, and by a **036°48′** lighted range. Two jetties, marked on their seaward ends by lights, protect the entrance. A fog signal is at the W jetty light.

In Anaheim Bay, during a flooding tide, the current 50 to 75 yards from the Naval Weapons Station's pier flows E to W as opposed to the normal flow of W to E. This causes a ship approaching the berth for a portside mooring to experience difficulty in twisting to starboard. An ebbing tide has an opposite effect. After a heavy rain, runoff water from the area N of Anaheim Bay during an ebbing tide increases the rate of ebb up to 5 knots with resultant swirls and countercurrents.

Two lighted, oil-production islands are about 0.8 mile SW and 1.2 miles WSW, respectively, of the entrance to Anaheim Bay; a fog signal is at each structure. The aids are privately maintained.

COLREGS Demarcation Lines.–The lines established for Anaheim Bay are described in 80.1135, chapter 2.

Huntington Harbour, a small-boat basin, is just S of Anaheim Bay. The harbor is a private development, and, with the exception of one small marina, consists of private docks adjacent to waterfront homes.

The harbor is entered through the restricted waters of Anaheim Bay, and permission to pass must be obtained from the Commanding Officer, U.S. Naval Weapons Station, Seal Beach, Calif. (See 204.195, chapter 2, for regulations governing passage.)

Storm warning signals are displayed. (See chart.)

Seal Beach, just NW of Anaheim Bay, has several resort structures and a 1,650-foot pleasure pier, which has a fish haven covered 9 feet at its seaward end.

Alamitos Bay, 15 miles NW of Newport Bay, is the site of the **Long Beach Marina,** a small-craft harbor administered by the city of Long Beach Marine Department. The harbor is entered from the S between two jetties each marked by a light on the seaward end. A fog signal is at the W jetty light.

A dangerous wreck is about 0.5 mile SSW of the entrance to Alamitos Bay.

In September 1973, depths of about 17 feet were reported in the entrance channel to the fueling station about 0.9 mile N of the jetty lights, with about 10 feet in the channel from the fueling station to the slips in the NE part of the bay.

A **nonanchorage area** has been designated at the mouth of the entrance channel to Alamitos Bay. (See 110.214 (a) (16) and (b), chapter 2, for limits and regulations.)

The fixed bridge across Marine Stadium, which forms the inner part of the bay, has a fixed span with a clearance of 32 feet. A fixed bridge with a clearance of 13 feet crosses the junction of the W waterway and Marine Stadium. A fixed bridge, with a clearance of 4 feet, crosses the W waterway between Naples and Belmont Shore. The five fixed bridges crossing the Rivo Alto Canal on Naples Island have a least clearance of 7 feet, and the power cable has a reported clearance of 55 feet.

Berths in Long Beach marina are limited to about 1,800 boats, but extensive parking and ramp-launching areas are provided for trailer-drawn craft. Visiting yachts may obtain temporary berthing on a first-come first-served basis. All mooring is controlled by a **harbormaster,** who has an office on the E side of the entrance channel near the end of the point about 500 yards above the bend in the channel.

Supplies and **repairs.**–All types of supplies and services are available at the marinas and service facilities in the bay. The largest repair yard can handle craft up to 40 tons and 60 feet. (See the small-craft facilities tabulation on chart 18747 for the latest listing of supplies and services available.)

Storm warning signals are displayed. (See chart.)

A pleasure pier on the W side of Belmont Shore, 1.7 miles NW of Alamitos Bay entrance, extends about 340 yards from the beach. A fog signal is on the end of the pier, and a fish haven is 100 feet off the seaward end. A reported wreck covered 16 feet is about 940 yards S of the end of Belmont Pier.

Charts 18751, 18749.–San Pedro Bay, between Seal Beach on the E and Point Fermin on the W, is 82 miles NW of San Diego. On the shores of the bay are the city of **Long Beach** and the port areas of the city of **Los Angeles. Terminal Island,** in the NW part of San Pedro Bay, separates the outer bay from Los Angeles and Long Beach inner harbors. The bay is protected by breakwaters and is a safe harbor in any weather.

Traffic Separation Scheme (Los Angeles/Long Beach), also known as **Traffic Separation Scheme (Gulf of Santa Catalina),** is in the approaches to Los Angeles/Long Beach. The Scheme leads from the Gulf of Santa Catalina through San Pedro Bay and the Santa Barbara Channel to Point Conception. (See charts 18740, 18720, 18725, 18746, 18721.) This Traffic Separation Scheme is recommended for use by all vessels traveling between the points involved, and is composed basically of four elements; **(1) Northbound Lanes, (2) Separation Zone, (3) Southbound Lanes, and (4) a Precautionary Area.** Traffic Lanes have been designed to aid in the prevention of collisions at the approaches to major harbors and along heavily traveled waters, but are not intended in any way to supersede or to alter the applicable Rules of the Road. Separation zones are intended to separate N and S traffic lanes, to be free of ship traffic, and should not be used except for crossing purposes. Mariners should use extreme caution when crossing traffic lanes and separation zones.

The **Precautionary Area** off the entrances to Los Angeles and Long Beach Harbors consists of the water area enclosed by a line connecting Point Fermin Light (33°42.3′N., 118°17.6′W.) with 33°37.7′N., 118°17.6′W., thence to 33°37.7′N., 118°05.4′W., thence to the shoreline at 33°41.7′N., 118°02.8′W. Extreme caution must be exercised in navigating within this area as both incoming and outgoing vessels use this area.

The **Traffic Separation Scheme** consists of a **Separation Zone** 2 miles wide with **one-way Traffic Lanes** on each side of the **Separation Zone.** In the Gulf of Santa Catalina the Separation Zone is centered on a line joining the following points: 33°37.7′N., 118°08.9′W., and 33°19.7′N., 118°03.4′W. In San Pedro Bay and in Santa Barbara Channel the center of the Separation Zone off Point Fermin is at 33°39.7'N., 118°17.6'W., and at the S "elbow" or turning point the center is 5.2 miles 205° from Point Vincente Light; the center at the N "elbow" or turning point is 4 miles 023° from Anacapa Island Light. The Port Hueneme Safety Fairway extends out to intersect the northbound traffic lane.

From the S end of the scheme in the Gulf of Santa Catalina the **northbound traffic lane** course is 345° for 18.5 miles to the **precautionary area,** thence in the **northbound (inshore) traffic lane** off Point Fermin the traffic lane course is **270°** for 8 miles to the S turning point, thence **300°** for 50 miles to the N turning point, thence **285°** for 61 miles through Santa Barbara Channel to the N end of the scheme off Point Conception. From the N end, the **southbound (offshore) traffic lane** course is **105°** for 61 miles through Santa Barbara Channel to the N turning point, thence **120°** for 50 miles to the S turning point, thence **090°** for 8 miles to the **precautionary area,** thence in the Gulf of Santa Catalina a course of **167°** for 18.5 miles to the end of the scheme off Santa Catalina Island. Lighted buoys mark the S turning point of the scheme 7.5 miles W and 9.5 miles SW of Point Fermin.

In 1980, two oil drilling platforms were under construction in the separation zone about 11 miles SE of Point Fermin in about 33°34'57"N., 118°07'40"W., and 33°34'57"N., 118°07'41"W. The platforms are in a **safety zone.** (See 147.01-1 through 147.03-5, and 147.05-11.04, chapter 2, for limits and regulations.)

Los Angeles Harbor, at the W end of San Pedro Bay, includes the districts of **San Pedro, Wilmington,** and a major portion of Terminal Island.

Long Beach Harbor, in the E part of San Pedro Bay, includes the City of Long Beach and a portion of Terminal Island on which is located the U.S. Naval Shipyard and Naval Station. Long Beach and Los Angeles Harbors are connected by Cerritos Channel. The distance between the seaward entrance to the two harbors is about 4 miles. Long Beach Inner Harbor, Middle Harbor, and Southeast Basin are protected by three curving moles.

Four oil production islands, marked by lights, are to the N and E of Long Beach Pier J. A fog signal is sounded from the S end of each island.

The **Port of Los Angeles,** one of the largest ports on the Pacific coast, has a history of leading the Pacific coast ports in terms of tonnage handled. It has extensive facilities to accommodate all types of traffic, and it is the only southern California port at which passenger vessels call regularly. Some of the principal exports are crude minerals, iron and steel scrap, coal and coke, iron ore and concentrates, inorganic chemicals, animal feeds, cotton, hides and skins, manufactured fertilizers, and fresh fruits and nuts. Some of the principal imports are iron and steel products, motor vehicles and parts, organic chemicals, fresh fruits and nuts, paper and paperboard, sugar, molasses and syrups, glass, and fresh and frozen fish.

The **Port of Long Beach,** also one of the largest ports on the Pacific coast, has the reputation of being America's most modern port. It has extensive foreign and domestic traffic with modern facilities for the largest vessels. It is a major container cargo port with several of the largest and most efficient container terminals on the Pacific coast. Some of the principal exports are bulk petroleum, bulk coke, iron ore and pellets, steel and steel products, bulk potash, grains, fresh fruits, scrap steel, animal feed, and copper concentrate. Some of the principal imports are crude petroleum, steel and steel products, motor vehicles and parts, machinery, bulk gypsum, newsprint, lumber, bulk salt, bananas, plywood, bulk molasses, and copra.

Prominent features.–**San Pedro Hill** (chart 18746), 3.3 miles NW of Point Fermin, is the distinguishing feature for making San Pedro Bay from SE or W. The hill terminates seaward in steep, rocky cliffs about 60 feet high, with several horizontal terraces between them and the summit. On top of the summit are two large white radar domes.

Because it is high above the usual low-lying fog area, the lighted tower atop Santa Catalina Island is reported a useful guide for vessels approaching the Los Angeles-Long Beach area; the light can be seen for about 16 miles.

Point Fermin, the SE extremity of San Pedro Hill, is a bold cliff about 100 feet high. A light is shown from a pole 120 feet above the water. A prominent pavillion (The Bell of Friendship) is on the high ground about 0.3 mile N of the light.

A very conspicuous neon sign, 130 feet above the ground at the Union Oil Co. plant on the W side of Wilmington, has the red numerals 76, 35 feet high, inside concentric circles of blue. The sign can be seen from S to E for 15 miles.

Signal Hill, Long Beach, rises to a height of 355 feet about 2 miles from the beach, and is readily recognized because of the many oil derricks around it.

Several prominent charted objects in Los Angeles Harbor which are of use to the navigator are the five stacks of a power plant NW of Slip No. 5, the tank at the center of Reservation Point, the tank near the S end of Pier 1, the lighted radio tower atop San Pedro City Hall, and the lighted observation tower at the Port of Calls Village about 0.4 miles S of the City Hall.

In Long Beach Harbor, prominent charted objects are the SW rectangular part of the charted L-shaped building at Berth 211 (which is the prominent gray rectangular tower of the Koppel grain elevator), a green hotel tower (marked by a large blue letter "b") located just NW of the Municipal Auditorium, and the white stone tower of another hotel 0.4 mile E. The derricks on the artificial oil islands E of Long Beach Pier J are constructed to appear as high-rise apartment buildings. A private light is atop the Long Beach Harbor Department Administration Building, 1.2 miles NW of the SE corner of Pier J.

Breakwaters.–**San Pedro Breakwater** extends about 0.9 mile in a SE direction from the E side of

Point Fermin, then turns ENE for another 0.9 mile to Los Angeles Light. **Middle Breakwater** extends ENE for 2.1 miles from the Los Angeles entrance, thence E for 1 mile to the Long Beach entrance, and is marked at both ends by lights. **Long Beach Breakwater** extends E 2.2 miles from Long Beach entrance and is marked by lights on both ends. Ranges for a **090°-270° measured nautical mile** are on the Long Beach Breakwater. They are yellow diamond-shaped daymarks on iron pipes.

Kelp beds are along the inside edge of the W end of Middle Breakwater and about midway along the inside edge of San Pedro Breakwater; the E bed is marked by orange and white banded drums and the W bed by white floats.

Los Angeles Light, (33°42.5'N., 118°15.0'W.), 73 feet above the water, is shown from a 69-foot white cylindrical tower, black pilasters on concrete block, on the outer end of the San Pedro Breakwater. A radiobeacon, fog signal, and a special radio direction finder calibration station are at the light. (See Light List for details.)

A light is shown from a white skeleton tower on a white concrete house on the W end of Middle Breakwater. **Long Beach Light** (33°43.4'N., 118°11.2'W.), 50 feet above the water, is shown from a 42-foot white rectangular tower on a white building on the E end of Middle Breakwater; a fog signal and radiobeacon are at the light. A light is shown from a white skeleton tower on the W end of Long Beach Breakwater, and another light is shown from a skeleton tower on the E end of the breakwater. A fog signal is at the E end light.

Caution.-The Coast Guard Captain of the Port, Los Angeles-Long Beach, has issued navigation orders concerning the pilot areas at the Los Angeles and Long Beach Harbor breakwater entrances shown on NOS charts 18746, 18747, 18749, 18751, and 18752. For purposes of these orders, controlled vessel means every vessel of 500 tons or more and every tug engaged in towing. Any controlled vessel not entering or leaving Los Angeles or Long Beach Harbors via the respective breakwater entrances shall stay clear of the pilot areas. The approaches to Los Angeles and Long Beach Harbors are marked by a lighted bell buoy and a lighted whistle buoy, respectively. Controlled vessels entering Los Angeles and Long Beach Harbors shall pass to eastward of the respective buoy, and controlled vessels leaving the harbors shall pass to westward of the buoys. Any other vessel shall stay clear of a controlled vessel in the pilot areas.

Vessels making the breakwater entrances should proceed at speeds no greater than is necessary for steerage. Vessels that approach the entrance close in and attempt to turn at or near the entrance are in danger of collision with outbound vessels, especially with smaller craft at night when their lights are not easily distinguishable at low tide or against the background of lights in the harbor.

Vessels awaiting a pilot should stay well to seaward and E of the outer fairway buoys.

COLREGS Demarcation Lines.-The lines established for San Pedro Bay are described in 80.1135, chapter 2.

Channels.-**Long Beach Channel** leads NW from W of Long Beach Breakwater for 2.2 miles to **Middle Harbor,** thence N to **Back Channel** and the **Inner Harbor.** The channel has a slight "dogleg" 1.5 miles NW of the breakwater to facilitate passage in and out of the Pier J berthing areas. A **restricted harbor entrance area** has been designated in the channel and side areas which extends from about 1 mile N of the breakwater to inside Middle Harbor; regulations of the Board of Harbor Commissioners, Port of Long Beach, grant priority to outbound vessels and stipulate a **6-knot speed limit** in this restricted area.

Most of the channels in Long Beach Harbor are maintained at more than the project depth of 35 feet. (See Notice to Mariners and latest editions of charts for controlling depths.)

Los Angeles Main Channel leads NW from E of the San Pedro Breakwater for about 1 mile, thence N to the Inner Harbor turning basin, thence NE through **East Basin Channel** and **Cerritos Channel.** About 0.6 mile NW of the breakwater, **Super Tanker Channel** leads W from the Main Channel to the deep-draft facilities at Berths 45-50. Los Angeles Main Channel from the breakwater to the Super Tanker Channel and the Super Tanker Channel are maintained at more than the project depth of 45 feet and 40 feet, respectively. (See Notice to Mariners and latest editions of charts for controlling depths.) In 1977-1978, a depth of 42 feet was 220 yards SE of Los Angeles Light, in about 33°42'25.5"N., 118°14'59"W.

Los Angeles Main Channel is marked by a **302°** lighted range, and the Super Tanker Channel is marked by a private **255°** lighted range. A private **342°** lighted range marks East Channel leading N of the Super Tanker Channel.

Caution.-Vessels should keep clear of the 500-foot-wide Los Angeles Main Channel during the passage of deep-laden tankships to and from Berths 45-47, and large bulk ore carriers from Berths 48-50. These vessels, because of their deep draft, must remain in the channel. Vessels not carrying a Los Angeles pilot may obtain information on the movement of such vessels by contacting the Los Angeles Pilot Station on VHF-FM channel 14 (156.70 MHz), call letters KMB-466; or on VHF-FM channel 16 (156.80 MHz).

Fish Harbor, on the S side of Terminal Island near its W end, is protected by two sets of breakwaters, the outer ends of which are marked by lights; a fog signal is at the offshore end of the W outer breakwater. A dredged channel with a controlling depth of about 19 feet leads between the outer and inner breakwaters to Fish Harbor, which has a controlling depth of about 18 feet. The seawall is lined with canneries and other fishworks. The outer breakwaters enclose the Yacht Club Anchorage, sometimes called the Fish Harbor Extension. This anchorage has depths of 22 to 25 feet E and depths of 11 to 14 feet W of the dredged channel.

Storm warning signals are displayed. (See chart.)

Anchorages.–Limits and regulations of general, naval, explosives, special, and nonanchorage areas in San Pedro Bay are given in **110.1, 110.100,** and **110.214,** chapter 2. When inside the breakwaters, vessels are required to anchor in the anchorage area prescribed in the regulations except in cases of great emergency. The Santa Ana is the only wind dangerous to vessels anchored inside the breakwaters.

Vessels are cautioned against anchoring in the vicinity of pipeline and cable areas shown on the charts.

Dangers.–A shoal area, with a rock covered 3 feet and a rock awash near the outer end, extends about 0.3 mile S of the shore just E of Point Fermin Light. A lighted whistle buoy is about 300 yards SW from the S end of the shoal area.

A **naval restricted area** is in the West Basin off the S shore of Terminal Island inside the jetty of the Naval Base Mole. (See 207.617, chapter 2, for limits and regulations.)

Rocks covered 19 feet and 25 feet are reported about 175 yards E and about 0.35 mile SSE of Naval Base Mole Light 2, respectively.

In March 1980, a submerged obstruction was reported about 0.35 mile NE of Long Beach Breakwater East End Light 1, in about 33°43'37.1"N., 118°07'48.8"W.

A **safety zone** for the protection of construction vessels and other boaters has been established, until further notice, around a marina under construction on the N side of the entrance to Queensway Bay. (See 165.01 through 165.25, and 165.1107, chapter 2, for limits and regulations.)

In September 1980, a landfill area, shallow water habitat, and a rock dike, were under construction between Fish Harbor and the Naval Base Mole. Lighted mooring buoys for barges and construction equipment are just S of the area. A **safety zone** has been established, until further notice, around the construction area. (See 165.01 through 165.25, and 165.1108, chaper 2, for limits and regulations.)

Bridges.–The Vincent Thomas Bridge, a highway suspension span with a clearance of 185 feet over the center 500-foot width, crosses Los Angeles Main Channel just below the turning basin, 3.2 miles above the entrance breakwater.

Two bridges cross Cerritos Channel on the N side of Terminal Island: Schuyler F. Heim Highway Bridge with span clearance of 37 feet down and 162 feet up; and Henry Ford Avenue railroad and highway bridge 25 yards W with a double-leaf bascule span with a clearance of 6 feet. Schuyler F. Heim Highway Bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). The bridge has an intercom connection with Henry Ford Bridge. Call sign: KXJ-749, Heim Bridge. (See 117.710 and 117.711, chapter 2, for drawbridge regulations and opening signals.)

It is reported that clearance gages have been established on a pier flanking the navigable span of the Schuyler F. Heim Bridge and on the fender system flanking the Henry Ford Avenue railroad and highway bridge. The gages indicate the vertical navigational clearance beneath each of the bridges at any height of tide.

Near the E end of Cerritos Channel are several power cables that have a clearance of 155 feet. Vessels are required to have a clearance of at least 6 feet under the cables to avoid the danger of arcing.

The Gerald Desmond Bridge, across Back Channel between Long Beach Inner Harbor and Middle Harbor, has a fixed span with a clearance of 155 feet.

The Queen's Way (Magnolia Avenue) Bridge, crossing **Queensway Bay** 0.8 mile W of oil **Island Grissom,** is a fixed span connecting downtown Long Beach with the terminal facilities on Pier J; clearances are 36 feet for the 500-foot main channel span or 45 feet at the center, and 31 feet elsewhere.

Tides.–The mean range of tide in Los Angeles Harbor is 3.8 feet, and in Long Beach inner and outer harbors the mean range is 3.7 feet. The diurnal range of tide is about 5.4 feet for these harbors. A range of about 9 feet may occur at times of maximum tides. The time of tide is about the same for Los Angeles and Long Beach Harbors. Daily predictions are given in the Tide Tables.

Currents.–The tidal currents follow the axis of the channels and rarely exceed 1 knot.

Surge.–Both Los Angeles and Long Beach Harbors are subject to seiche and surge. The most persistent and conspicuous oscillation has a period of approximately 1 hour. In the vicinity of Reservation Point and near the E end of Terminal Island, the hourly surge is very prominent, causing velocity variations which at times may be as great as 1 knot, and which often overcome the lesser tidal current so that the current floods and ebbs at half-hour intervals. Because of the more restricted channel, the surge through Back Channel at the E end of Terminal Island usually reaches a greater velocity than through the channel W of Reservation Point. In Back Channel, the hourly variation may sometimes be 1.5 knots or more. The hourly surge, together with other oscillations of shorter period and of more irregular occurrence, at times causes a very rapid change both in height of the water and the velocity and direction of the current and may endanger vessels tied up at the piers. A 3-minute surge is reported to be responsible for major ship movements and damage. Pilots advise taut lines to reduce the effect of the surge.

Weather.–Fog is most likely from September through January and in April. Out over the bay, it drops visibilities below 0.[illegible] mile on about 7 to 10 days per month during this period. It is mostly a land (radiation) fog that drifts out and is worst in the late night and early morning. Smoke from nearby industrial areas often adds to the thickness and persistence of the fog. There are times when it will hang over the inner channels for several days and along the coast can be very local in occurrence. For example, at Long Beach, which is particularly susceptible to cold air drainage, fog reduces visibilities to less than 0.5 mile on an average of 18 more days annually than at nearby Los Angeles International Airport. Along the shores, visibilities drop to less than 0.5 mile on about 3 to 8 days per month from August through April; December is usually the worst month.

Winds are variable particularly in fall and winter. They are also strongest during this period when the **Santa Ana** wind can blow. This is an offshore desert wind which, though infrequent, may be violent. It occurs when a strong high-pressure system sits over the plateau region and generates a NE to E flow over southern California. The air streams through Cajon Pass into the Great Valley, swings toward the SW, and follows either the Santa Ana River Canyon through the Santa Ana Mountains or moves directly over the low mountains S of the canyon and then follows a well-defined path over the plains of Orange County to reach the ocean near Newport. It diminishes little in intensity immediately after passing over the bay, and some reports credit it with blowing far out to sea. However, beyond 50 miles from shore, Santa Anas are of little concern. These winds have reached speeds of 50 knots or more along the coast. Los Alamitos had a gust of 54 knots.

Aside from weather forecasts, there is little warning of the onset of a Santa Ana. For some hours preceding its arrival, good visibility and unusually low humidity often prevail. Shortly before its arrival on the coast, the Santa Ana may be observed as an approaching dark-brown dust cloud. This will often give from 10 to 30 minutes warning, and is a positive indication. The Santa Ana may come at any time of the day. It can be reinforced by a land breeze in the early morning or weakened by a sea breeze during the afternoon.

Winter storms are also responsible for strong winds over San Pedro Bay, particularly from the SW through NW. Winds of 17 knots or greater occur about 1 to 2 percent of the time from November through May. Winter winds often have an E component, although WNW winds are most frequent at Long Beach. At Los Angeles International Airport, W and NE winds are the most common, while at Los Alamitos, NE, E, and SW winds are frequent. However, at both locations, calm conditions are as common or more so from fall through spring. SW through W winds begin to prevail in spring, and this lasts through the summer and into early fall.

The National Weather Service maintains an office at Long Beach Airport, Los Angeles International Airport, and downtown Los Angeles (see appendix for address); barometers may be compared at these locations or by telephone.

(See page T-2 for **Los Angeles climatological table.**)

Pilotage.–Any vessel entering, leaving, or shifting within the Ports of Los Angeles and Long Beach may, but is not required to, request the services of and be piloted by a municipal pilot. All foreign vessels and all vessels of 300 gross registered tons and over, sailing under U.S. register, are subject to a pilotage fee whether or not a municipal pilot is actually employed. Vessels under enrollment, licensed and engaged in the coastwise, intercoastal, and fishing trades between the ports of Los Angeles or Long Beach and any other U.S. port, while under the control and direction of a pilot duly licensed under the laws of the United States for the ports of Los Angeles and Long Beach, are exempt from pilotage unless a pilot is employed.

The Los Angeles pilots board vessels from one of two pilot boats outside of Los Angeles Channel Approach Lighted Bell Buoy LA. The pilot boats have black hulls and white pilothouses with "L.A. PILOTS" on each side in large black letters. The boats display the International Code flag H. The Los Angeles pilot station, at the outer end of Pier 1, monitors VHF-FM channels 14 (156.70 MHz) and 16 (156.80 MHz) 24 hours a day. The pilot boats use VHF-FM channel 14 (156.70 MHz) as a working frequency and cooperate with the radar station at the pilot station. The call letters are KMB-466. The whistle signal for calling a pilot is one long and one short blast.

Los Angeles pilots usually board vessels on the starboard side in normal weather. In SE weather, when the sea is breaking in the entrance, they will board the vessel inside the breakwaters NE of the W light of the Middle Breakwater. Vessels unable to make the entrance in foul weather should anchor E of the fairway on a bearing of 300°, or less, on the W end light on the Middle Breakwater. A pilot ladder about 3 feet off the water is requested.

The Long Beach pilots board vessels from one of two pilots boats in the vicinity of Long Beach Channel Approach Lighted Whistle Buoy LB. The boats have gray hulls and white pilothouses with "LONG BEACH PILOTS" on each side in large black letters. The boats display an 8-second flashing white light at night and the International Code flag H. The Long Beach pilot station, at the NW corner of Pier F immediately adjacent to Middle Harbor E entrance light, monitors VHF-FM channels 12 (156.60 MHz) and 16 (156.80 MHz) 24 hours per day. The pilots boats use VHF-FM channel 12 (156.60 MHz) as a working frequency and also monitor channel 13 (156.65 MHz). The call letters are KMA-372. The whistle signal for calling a pilot is one short and one long blast.

Long Beach pilots usually board vessels on the starboard side in normal weather. A pilot ladder about 3 feet off the water is requested.

Vessels approaching Long Beach or Los Angeles Harbors should radio their estimated time of arrival at the designated sea buoy 2 hours in advance to the Long Beach or Los Angeles pilot stations.

Towage.–Three large tugboat companies and several smaller companies operate in the Los Angeles-Long Beach area with tugs up to 2,900 hp available. Large vessels usually have one of more tugs in attendance while berthing at or departing from the wharves along the inner channels.

Los Angeles and Long Beach are both **customs ports of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard.–The **Captain of the Port office,** a **marine inspection office,** and a **vessel documentation office** are at Long Beach Harbor. (See appendix for address.)

Harbor regulations.–Local rules and regulations for the Port of Los Angeles are enforced by the Port Warden of the Harbor Department. The Los Angeles Harbor Department Headquarters are at 425 South Palos Verdes Street, San Pedro.

Similar regulations for the Port of Long Beach are enforced by a Port Manager of the Harbor Department assigned by a Board of Harbor Commissioners. The Long Beach Harbor Department Administration Building is on Pier "A" at 925 Harbor Plaza, Long Beach. The **speed limit** for Middle Harbor and Inner Harbor is 6 knots.

Permits are required from the Port Warden for any method of underwater diving within Los Angeles Harbor. Similarly, a permit from the Port Manager is required in Long Beach Harbor.

Copies of the regulations may be obtained from the local office concerned.

The **Los Angeles-Long Beach Marine Exchange** operates a 24-hour lookout station to report all vessel movement in, out, or around the port area. The lookout station, atop Warehouse No. 1 at Pier 1 on the W side of Los Angeles main channel, has both radio and visual communication equipment to report movement of vessel traffic. The station handles traffic on VHF-FM channels 12 (156.60 MHz) and 14 (156.70 MHz) and also monitors channel 16 (156.80 MHz).

Storm warning signals are displayed. (See chart.)

Wharves.–The Port of Los Angeles has over 100 piers and wharves. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 28, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths for the facilities described are reported depths. (For information on the latest depths contact the Port of Los Angeles or the private operators.) Most of the piers and wharves are owned by the City of Los Angeles. Most of the piers and wharves have water and electrical shore power connections, and highway and railroad connections.

General cargo at the port is usually handled by ship's tackle. Special handling equipment, if available, is mentioned in the description of the particular facility. Floating cranes up to 425 tons are available.

The port of Los Angeles has about 469 acres of open storage space and about 1¾ million square feet of warehouse storage space.

The office of the chief wharfinger is at 425 South Palos Verdes Street, San Pedro.

Facilities in Los Angeles Outer Harbor:

Berth 37: 460 feet long, 35 to 38 feet alongside; deck height, 14 feet; nine hose-handling derricks service Berths 38–40; mooring and fueling naval vessels; operated by U.S. Navy.

Berths 38–40: 1,370 feet long, 35 to 38 feet alongside; deck height, 14 feet; mooring and fueling naval vessels; operated by U.S. Navy.

Berths 45–47 (supertanker terminal): 1,058 feet of berthing space with mooring platforms; 51 feet alongside; deck height, 16 feet; three unloading arms; receipt of crude oil, occasional shipment of petroleum products, and bunkering for tankers using the terminal; operated by Union Oil Co., and Mobil Oil Co.

Berth 48: 150 feet of berthing space with dolphins; 20 to 25 feet alongside; deck height, 16 feet; receipt of bunker fuel for bunkering tankers at Berth 46; operated by Mobil Oil Co.

Berths 49–50 (bulk loader): 800 feet of berthing space with dolphins; 52 feet alongside; deck height, 14½ feet; bulk loader system with wharf loader, traveling bulk stacker, and a crawler loader, a loading rate of 2,400 tons per hour; 14 acres open storage; one 30-ton traveling, revolving gantry crane with a 120-foot boom on apron; shipment of iron ore pellets; operated by American Bulkloading Enterprises, Inc.

Berths 51–52: 1,500 feet of berthing space; 37 to 45 feet alongside; deck height, 14 feet; one 150-ton and two 50-ton diesel crawler cranes with 140-foot and 70-foot booms, respectively; 5 acres open storage; mooring for ship breaking; operated by Union Minerals & Alloys, Co.

Berths 53–55: 1,200 feet of berthing space; 33 to 38 feet alongside; deck height, 14 feet; 43,750 feet open storage; 102,600 feet covered storage; receipt and shipment of general cargo in foreign trade including cotton and refrigerated cargo; operated by Beaufort Terminal, Inc.

Berth 56: 160 feet of berthing space; 35 feet alongside; deck height, 14 feet; mooring research vessels; operated by State of California, Department of Fish and Game.

Berths 57–60: 2,480 feet of berthing space; 33 to 38 feet alongside; deck height, 14 feet; 220,000 square feet of covered storage; receipt and shipment of general cargo in foreign trade; operated by Crescent Wharf & Warehouse Co. and Beaufort Terminal, Inc.

Berths 70–71 (petrochemical terminal): 770 feet long, 800 feet of berthing space with dolphins; 30 to 35 feet alongside; deck height, 15 feet; oil and chemical pipelines extend from wharf to storage; receipt and shipment of petrochemicals; receipt of petroleum products and chemicals; operated by GATX Terminals Corp.

Berth 72: 460 feet of berthing space; 27 feet alongside; deck height, 14 feet; receipt of fish; operated by various operators.

Facilities on W side of Main Channel:

Berths 87–92: 35 feet alongside; deck height, 15 feet; 130,000 square feet of covered storage; two 40-ton container cranes; eight 15-to 20-ton forklifts; eight straddle cranes; paved open storage for 3,000 containers, total storage area of 30 acres; bunker fuel piped to all berths; receipt and shipment of general and containerized cargo; operated by American President Lines, Ltd.

Berths 93A–93B: 1,232 feet of berthing space; 36 feet alongside; deck height, 15 feet; two-story terminal building, lower level for cargo, upper level for passengers; baggage conveyors and gangways extending from passenger terminal (upper deck) to ship side; two gangway cranes on roof of building; passenger terminal served by elevators and escalators; 50,000 square feet of open storage area back of shed, 60,000 square feet of open storage in rear of Berth 93C, auto parking and maintenance area of about 108,000 square feet in NW section of terminal yard; pipelines extend from berths to storage; receipt and shipment of general cargo in foreign and domestic trade, idle mooring of vessel-borne barges, bunkering of vessels, berthing passenger liners; operated by American President Lines, Ltd. A U.S. Customs office is at the passenger terminal.

Berths 97–98: 912 feet of berthing space with dolphins; 33 feet alongside; deck height, 11 feet; pipelines extend from berths to storage and to company refinery at El Segundo; receipt and shipment of petroleum products, bunkering vessels, loading barges; operated by Chevron U.S.A., Inc.

Facilities in Southwest Slip and West Basin:

Berths 101–102: 785 feet of berthing space; 36 feet alongside; deck height, 13 feet; pipelines extend from berths to storage; bunker pipelines extend to Berths 195–198, Crescent Wharf and Warehouse Co., to Berths 90–93B, American President Lines, and to Berths 163–164, Edgington Oil Refineries, Inc.; receipt and shipment of petroleum products, bunkering tankers, loading barges; operated by Chevron U.S.A., Inc.

Berths 118–119: 821 feet long; 35 feet alongside; deck height, 13 feet; pipelines extend from berths to storage; receipt and shipment of petroleum products; receipt of crude oil; bunkering vessels; loading barges; operated by GATX Terminals Corp., and Fletcher Oil Co.

Berth 120: 401 feet of berthing space; 32 feet alongside; deck height, 13 feet; pipelines extend from berths to storage; receipt and shipment of petrochemicals and petroleum products, including parrafin; receipt of crude oil and liquified petroleum gas; bunkering vessels; loading barges; operated by Western Fuel Oil Co. and Petrolane, Inc.

Berth 126: 600 feet of berthing space; 35 feet alongside; deck height, 15 feet; mobile equipment for handling lumber; receipt of lumber; operated by Sun Handling Dock.

Berths 127–129: 1,000 feet of berthing space; deck height, 15 feet; 35 feet alongside; paved open storage for 2,500 containers, 200 spaces for refrigerated containers, total area 30 acres; one 40-ton container crane; five 40-ton mobile cranes; two 10-ton forklifts; receipt and shipment of containerized cargo in foreign trade; operated by Los Angeles Container Terminal Co., Inc.

Berths 130–131: 1,000 feet of berthing space; 35 feet alongside; deck height, 15 feet; paved open storage for 1,230 containers, 130 spaces for refrigerated containers, total area 16 acres; one 40-ton container crane; one 40-ton straddle crane; one 25-ton container lift truck; receipt and shipment of containerized general cargo in foreign and domestic trade; operated by Crescent Wharf & Warehouse Co., and Seatrain Lines Inc.

Berths 134–135: two faces, 780 feet and 304 feet long; 25 to 35 feet alongside; deck height, 13 feet; 100 acres of paved open storage; receipt of foreign automobiles; operated by Distribution and Auto Service, Inc.

Berths 136–139: 1,800 feet long; 35 feet alongside; deck height, 15 feet; 128,000 square feet of covered storage; 12.5 acres of open storage; three 90-ton mobile cranes; molasses pipelines extend from wharf to storage; receipt and shipment of general cargo in foreign and domestic trade; receipt of steel products, molasses and automobiles; operated by Metropolitan Stevedores Co. and Distribution and Auto Services, Inc.

Berths 142–145: 2,415 feet of berthing space; 35 feet alongside; deck height, 14 to 15 feet; 127,000 square feet covered storage; 126,000 square feet open storage; molasses pipeline from Berth 142 to storage; receipt and shipment of conventional containerized, and roll-on/roll-off general cargo in foreign trade; receipt of steel products, molasses, heavy equipment and machinery; operated by California United Terminals Co., and General Steamship Corp., Ltd.

Berth 146: 816 feet of berthing space; 35 feet alongside; deck height, 13½ feet; 71,000 square feet covered storage; open storage for 40 containers in rear of transit shed; receipt and shipment of military cargo; operated by Marine Terminals Corp.

Berth 147: 550 feet of berthing space with dolphins; 35 feet alongside; deck height, 14 feet; four traveling gantry type banana unloaders, each with 40-foot working reach and a capacity of 4,000 boxes per hour; a conveyor extends from wharf to rail and truck loading platforms, capacity 16,000 boxes per hour; receipt of bananas; operated by United Brands Co.

Berths 148–149: 608 feet of berthing space; 33 feet alongside; deck height, 15½ feet; one hose-handling derrick; pipelines extend from berths to storage; receipt and shipment of petroleum products; bunkering vessels; loading fuel barges; receipt of liquid ammonia; operated by Union Oil Co. of California.

Berths 150–151: 736 feet of berthing space; 33 feet alongside; deck height, 14 feet; pipelines extend from berths to storage; six ½-ton hose-handling derricks; receipt and shipment of petroleum products, liquid ammonia; bunkering vessels; loading fuel barges; operated by Union Oil Co. of California.

Slip 1:

Berths 153–155: 1,766 feet of berthing space; 35 feet alongside; deck height, 12½ feet; 124,000 square feet of covered storage; bunker oil lines connect to wharf; one 1-ton electric cargo elevator; one electric passenger elevator and escalator; two electric ramps; two gantry-type platforms; receipt and shipment of containerized and general cargo in foreign and domestic trade; passengers; bunkering vessels; operated by Delta Line Inc., and Crescent Wharf and Warehouse Co.

Berths 163–164: wharf face in three sections, 485 feet, 409 feet, and 65 feet; two berthing spaces with dolphins, 485 feet and 609 feet; 25 to 39 feet alongside; deck height, 12 feet; receipt and shipment of petroleum products, petrochemicals; receipt of crude oil; bunkering vessels, and loading fuel barges; operated by Golden Eagle Refining Co., Inc., Chevron Chemical Co., and Edgington Oil Refineries, Inc.

Berths 165–166: wharf in three sections, 640 feet, 125 feet, and 20 feet; one large berth 640 feet long; 37 feet alongside; deck height, 12 feet; 18,800 square feet of covered storage; bulk loader, loading rate between 900 and 1,200 tons per hour depending on the cargo; bulk storage 34,500 short tons; bulk and bagged borate and borate products; owned and operated by U.S. Borax and Chemical Co.

Berths 167–169: 1,314 feet of berthing space with dolphins; 35 feet alongside; deck height, 12 feet; pipelines extend from wharf to storage tanks; five 1-ton derricks, each with two 35-foot booms; receipt of crude oil; receipt and shipment of petroleum products; bunkering vessels, and loading fuel barges; operated by Shell Oil Co.

East Basin Channel:

Berths 171–173: 1,412 feet of berthing space; 35 to 37 feet alongside; deck height, 12 feet; pipelines extend from berths to storage; receipt of crude oil; shipment of petroleum products; bunkering vessels; loading fuel barges; operated by Continental Oil Co.

Berths 174–176: 1,312 feet of berthing space; 33 to 35 feet alongside; deck height, 11 feet; 70,000 square feet of covered storage; one 7-ton traveling full portal crane; portable ship-loading conveyor and trimmer, loading rate to vessels 400 tons per hour; portable marine leg for unloading bulk granular feed products, capacity 125 tons per hour; grain storage capacity, 410,000 bushels; pipelines extend from berths to storage; bunker oil pipelines serve berths; receipt and shipment of general and containerized cargo in foreign and domestic trade; shipment of grain, alfalfa pellets; other granular feed products; animal and vegetable oils; bunkering vessels; operated by Mortimer and Wallace, Inc., Los Angeles Harbor Grain Terminal, and Crescent Wharf and Warehouse Co.

Slip 5:

Berths 177–179: 1,420 feet long; 35 feet alongside; deck height, 10 feet; 83,000 square feet of covered storage; 3 acres of open storage; receipt and shipment of conventional and containerized general cargo in foreign and domestic trade; receipt of steel products and automobiles; operated by Crescent Wharf and Warehouse Co.

Berths 180–181: 925 feet of berthing space; 33 to 40 feet alongside; deck height, 10 feet; 89,000 square feet of covered storage; pipeline extends from Berth 181 to storage tanks; receipt and shipment of general cargo in foreign and domestic trade; receipt of fuel oil for plant consumption; operated by Crescent Wharf & Warehouse Co., City of Los Angeles Department of Power and Water.

Berths 184–185: 760 feet of berthing space; 25 to 30 feet alongside; deck height, 11 feet; one 6-ton and one 2-ton forklift trucks, electric ramps for roll-on/roll-off cargo; receipt and shipment of general cargo for Santa Catalina Island by barge; mooring vessels; operated by Catalina Freight Line Co.

Berths 187–188: 631 feet long; 35 to 38 feet alongside; deck height, 10 feet; pipelines extend from wharf to storage; 43 storage tanks with 10,000,000 gallon capacity for vegetable oil, 18,000,000 gallons for chemicals; receipt and occasional shipment of caustic soda and other chemicals; receipt of fuel and vegetable oils; loading barges; one hose-handling crane with 7-foot boom; operated by Wilmington Liquid Bulk Terminals, Inc.

Berths 190–191: 1,103 feet long; 35 to 38 feet alongside; deck height, about 10 to 12 feet; 59,000 square feet of covered storage; 4.5 acres of open storage; receipt of lumber and wood products; operated by Coos Head Lumber and Plywood Co.

East Basin:

Berths 195–198: 1,559 feet of berthing space; 35 to 37 feet alongside; deck height, 15 to 16 feet; 139,000 square feet of covered storage; second floor is passenger terminal which is served by Berth 196; portable belt conveyors and cargo ramps; one traveling adjustable passenger platform; escalators and ramps serve passenger terminal; bunker oil lines serve all berths; automobile storage area; receipt and shipment of conventional and containerized general cargo; receipt of automobiles, passengers; bunkering vessels; operated by Crescent Wharf and Warehouse Co.

Berth 199: 714 feet long; 35 feet alongside; deck height, 15 feet; 63,000 square feet of covered storage; receipt of automobiles; operated by Koppel Dock & Storage Co.

Berth 200A: 738 feet long; 36 to 38 feet alongside; deck height, 15 feet; container station; 18 acres of paved open storage; 26 acres of automobile storage; receipt of automobiles; operated by Koppel Dock & Storage Co.

Terminal Island:

Berths 207–209: 1,580 feet long; 35 feet alongside; deck height, 15 feet; one 37-ton and two 25-ton traveling container cranes; 16 25-ton mobile straddle carriers; 46,000 square feet of covered storage; paved open storage for 4,000 containers, 193 refrigerated containers, total area 54 acres; receipt and shipment of containerized roll-on/roll-off cargo, occasional conventional cargo for foreign and domestic trade.

Berths 210–211: 566 feet of berthing space with dolphins; 35 feet alongside; deck height, 13½ feet; loading tower on wharf with 60-foot boom for shredded scrap metal; belt conveyor extends from scrap metal hammer mill and from open storage area to loading tower, loading rate 500 tons per hour; one 50-ton traveling gantry crane on wharf with 110-foot boom and magnets; bulldozers; shipment of scrap metal; operated by Hugo Neu-Proler Co.

Berth 215: 450 feet of berthing space with dolphins; 35 feet alongside; deck height, 13 feet; oil pipelines extend from wharf to storage and to refineries at Santa Fe Springs and Huntington Beach; bunkering line extends from the storage tanks to Berths 218–225; two 1-ton hose-handling derricks; receipt and shipment of petroleum products and petrochemicals; bunkering vessels alongside, and loading fuel barges; operated by Gulf Oil Corp, U.S. Division of Gulf Oil Corp.

Berths 216–217: 897 feet long; 34 to 35 feet alongside; deck height, 13 feet; oil and chemical pipelines extend to storage; receipt and shipment of petroleum products and petrochemicals; mooring of vessels and barges; pipelines extend from wharf to storage; 7.5 acres of open storage for automobiles; operated by Refiners Marketing Co.

Berths 218–225: 3,569 feet of berthing space; 35 feet alongside; deck height, 15 feet; 262,000 square feet of covered storage; bunker fuel line serves all berths; receipt and shipment of general and containerized cargo in foreign and domestic trade; receipt of steel products and automobiles; operated by Indies Terminal Co.

Berths 228D and 228E: 1,089 feet of berthing space; 35 feet alongside; deck height, 15 feet; 94,000 square feet of covered storage; 9,000 square feet of open storage; receipt and shipment of general and containerized cargo in foreign and domestic trade; receipt of steel products, lumber, cotton, and automobiles, some passengers; operated by Overseas Shipping Co.

Berths 229–230: 1,270 feet of berthing space; 35 feet alongside; deck height, 15 feet; 36 acres of paved container storage; one 40-ton traveling container crane; one 35-ton traveling container crane; two 30-ton container bridge cranes; six 20-ton straddle cranes; receipt and shipment of general and containerized cargo in foreign trade; operated by Overseas Shipping Co.

Berths 231–232: 180 feet long; 35 feet alongside; deck height, 15 feet; Berths 231 and 232 were under construction in 1979; to be used for receipt and shipment of containerized general cargo in foreign and domestic trade.

Berths 233–235: 1,000 feet of berthing space; 35 feet alongside; deck height, 15 feet; one 40-ton traveling container crane; four straddle carriers; pipeline extends from wharf to storage; 15 acres of open storage; receipt and shipment of containerized general cargo in foreign and domestic trade; bunkering vessels; operated by Marine Terminals Corp.

Berths 237–238: two 227-foot offshore wharves 238 feet apart, total of 810 feet of berthing space along both wharves and dolphins; 35 feet alongside; deck height, 14 feet; pipelines extend to storage; receipt and shipment of petroleum products; receipt of crude oil; bunkering vessels alongside, and loading fuel barges; operated by Mobil Oil Corp., d.b.a., West Coast Pipe Lines.

Berths 240A and 240B: two 226-foot wharves 370 feet apart; 20 to 35 feet alongside; deck height, 14 feet; pipelines to storage and to refinery at Torrance; one hose-handling winch; receipt and shipment of petroleum products; receipt of crude oil; bunkering vessels, loading barges; operated by Mobil Oil Corp., d.b.a., West Coast Pipe Lines.

The **Port of Long Beach** has 67 piers and wharves. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 28, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths for the facilities described are reported depths. (For information on the latest depths contact the Port of Long Beach or the private operators.) Most of the piers and wharves are in East and Southeast Basins. Several wharves in the Inner Harbor are privately owned and operated. Most of the major facilities are owned by the Port of Long Beach. Most of the piers and wharves have water and electrical shore power connections, and highway and railroad connections.

General cargo at the port is usually handled by ship's tackle. Special handling equipment, if available, is mentioned in the description of the particular facility. Floating cranes up to 385 tons are available.

The port of Long Beach has about 342 acres of open storage and about 1½ million square feet of warehouse storage space available.

The office of the chief wharfinger is in the building at the head of the easternmost slip in East Basin.

Southeast Basin and Basin Six:

Pier J:

Berths 245–247 (container terminal): 2,200 feet of berthing space with dolphins; 34 to 40 feet alongside; deck height, 16 feet; 100,000 square feet of covered storage; 25 acres of open storage; three 40-ton traveling container cranes; three 40-ton and one 30-ton mobile bridge cranes; pipelines extend from wharf to storage; receipt and shipment of containerized and conventional general cargo; bunkering vessels; operated by Pacific Container Terminal.

Berths 243–244 (automobile terminal): 1,212 feet of berthing space; 42 to 49 feet alongside; deck height, 16 feet; 75 acres of automobile storage; receipt of foreign automobiles; bunkering vessels; pipelines extend from berths to storage; operated by Canal Industrial Park, Inc., Toyota Motor Sales, U.S.A., Inc.

Berth 242: 150-foot-long offshore wharf; 320 feet of berthing space with dolphins; 30 to 34 feet alongside; deck height, 15 feet; pipelines to storage tanks having a capacity of 18 million gallons; receipt of molasses; operated by National Molasses Co.

Berths 232–234: 2,300 feet of berthing space; 32 to 46 feet alongside; deck height, 16 feet; 53,000 square foot container freight station; 64 acres of paved open storage; four 30-ton traveling container cranes; six 40-ton mobile bridge cranes; receipt and shipment of containerized cargo in foreign and domestic trade; bunkering vessels; operated by International Transportation Service, Inc.

Pier G:

Berth 230: 800 feet of berthing space; 42 to 49 feet alongside; deck height, 16 feet; 18,500 square feet of container freight area; 23 acres of paved open storage; two 30-ton traveling container cranes; receipt and shipment of containerized cargo; bunkering vessels; operated by United States Lines, Inc.

Berths 227–229: 1,800 feet of berthing space; 39 to 49 feet alongside; deck height, 16 feet; 72,000 square foot container freight station; 37 acres of paved open storage; four 30-ton traveling container cranes; receipt and shipment of containerized cargo in foreign and domestic trade; bunkering vessels; operated by Sea-Land Service, Inc., Maersk Line Agency.

Berths 212–215: 1,910 feet of berthing space; 34 to 43 feet alongside; deck height, 19 feet; five covered storage areas with a 276,000-ton capacity for coke; open storage areas with an 82,000-ton capacity for coke; one electric traveling bulk shiploader, with 58-foot outboard reach boom, 60-inch electric belt conveyor, loading rate in tons per hour; coke, 2,500, iron ore, 5,895, iron ore pellets, 4,910, potash, 2,955; shipment of iron ore, iron ore pellets, potash and petroleum coke; operated by Metropolitan Stevedore Co.

Pier A:

Berth 211A: 240 feet of berthing space; 36 to 42 feet alongside; deck height, 19 feet; pipelines extend from berths to storage; loading barges; operated by Exxon Company, U.S.A.

Berth 211: 550 feet of berthing space; 39 to 41 feet alongside; deck height, 19 feet, 2.2-million-bushel storage capacity; one traveling gantry ship loader with spout, 60-inch belt conveyor; shipment of grain; Koppel Bulk Terminal Co.

Berths 209–210: 1,100 feet of berthing space; 39 to 41 feet alongside; deck height, 19 feet; conveyor system for ship discharging; pipelines from berths to storage; receipt of salt and petroleum products; bunkering vessels; loading barges; operated by Exxon Co., U.S.A., Ocean Salt Company, Inc., National Molasses Co.

Berth 208: 520 feet of berthing space; 32 to 41 feet alongside; deck height, 19 feet; pipelines extend from berths to storage; four electric unloaders; belt conveyor system; receipt of bananas; bunkering vessels; operated by Standard Fruit and Steamship Company.

Pier F:

Berths 206–207A: 1,465 feet of berthing space; 35 to 38 feet alongside; deck height, 18½ feet; 155,000 square feet covered storage; 5 acres open storage; pipelines extend from berths to storage; receipt of steel and lumber; occasional shipment of general cargo in foreign and domestic trade; bunkering vessels; operated by Crescent Terminals, Inc.

Berths 204–205: 1,267 feet of berthing space; 36 to 44 feet alongside; deck height, 19 feet; pipelines extend from berths to storage; 135,000 square feet of covered storage; operated by Mercantile and Marine Terminals, Inc.

Storm warning signals are displayed. (See chart.)

East Basin Pier A:

Berths 201, 10, and 9: 2,000 feet of berthing space; 29 to 39 feet alongside; deck height, 16 and 14 feet; 175,000 square feet of covered storage; 5.5 acres of open storage; pipelines extend from berths to storage; receipt and shipment of general cargo, including lumber and steel, in foreign and domestic trade; bunkering vessels; operated by Pierpoint Management Co.

Berth 7: 736 feet of berthing space; 35 to 39 feet alongside; deck height, 9 feet; 108,000 square feet of covered storage; pipelines extend from berth to storage; receipt and shipment of general cargo in foreign and domestic trade; bunkering vessels; various operators.

Berth 6: 650 feet of berthing space; 108,000 square feet of covered storage; 4 acres of paved open storage; 37 feet alongside; deck height, 9 feet; pipelines extend from berth to storage; receipt of lumber and newsprint; bunkering vessels; operated by Forest Terminals, Inc.

Berths 1–5: 2,925 feet of berthing space; 32 to 38 feet alongside; deck height, 37 feet; 216,000 square feet of covered storage; 9 acres of paved open storage; pipelines extend from berths to storage; receipt and shipment of general cargo in foreign and domestic trade, including citrus fruits, rubber, sisal hemp, and lumber products; bunkering vessels; operated by Salen Shipping Agencies, Inc.

Pier B:

Berths 12–13: 1,270 feet of berthing space; 33 to 38 feet alongside; deck height, 22 feet; 177,000 square feet of covered storage; 2.2 acres of open storage; pipelines extend from berths to storage; receipt and shipment of general cargo in foreign and domestic trade; bunkering vessels; operated by California United Terminals Co., Inc.

Berths 17–18: 1,200 feet of berthing space; 32 to 39 feet alongside; deck height, 18½ feet; 4.5 acres of open storage; pipelines extend from berths to storage; receipt and shipment of containerized and conventional general cargo in foreign and domestic trade; bunkering vessels; operated by California United Terminals Co., Inc.

Pier C:

Berths 20–22: 1,994 feet of berthing space; 33 to 39 feet alongside; deck height, 17 to 18 feet; 179,000 square feet of covered storage; pipelines extend from berths to storage; spaces for 14 refrigerated containers; receipt and shipment of containerized and conventional general cargo in foreign and domestic trade; bunkering vessels; operated by California United Terminals Co., Inc.

Berths 24–26: 1,942 feet of berthing space; 35 to 40 feet alongside; deck height, 17 feet; platform, 11 feet; paved, open storage for 1,350 containers, total area 11 acres; terminal under construction in 1979, pipeline extends from berths to storage; two 40-ton container cranes; roll-on/roll-off ramps; two 40-and one 30-ton straddle cranes; receipt and shipment of containerized and general cargo in foreign and domestic trade; bunkering vessels; operated by California United Terminals Co., Inc.

Pier D:

Berth 27: 380 feet long; 35 feet alongside; deck height, 12 feet; receipt and shipment of roll-on/roll-off cargo containers; under construction in 1979; operated by California United Terminals Co., Inc.

Berths 28–31: 1,984 feet of berthing space; 40 to 48 feet alongside; deck height, 11 feet; single-spout conveyor type dry bulk cargo loader; three traveling full-portal gantry cranes; pipelines extend from berths to storage; 6 acres of open storage; shipment of dry bulk, including coke, salt cake, soda ash, and potash; receipt and shipment of vegetable oil and animal fats; bunkering vessels; operated by Metropolitan Stevedore Co. and Baker Commodities, Inc.

Berths 32–34: 1,607 feet of berthing space; 34 to 38 feet alongside; deck height, 13 feet; 66,000 square feet of covered storage; pipelines extend from berths to storage; receipt and shipment of general cargo in foreign and domestic trade; receipt of bananas; receipt and shipment of animal fats and vegetable oils; bunkering vessels; operated by Baker Commodities, Inc. and various operators.

Pier E:

Berth 118: three section wharf; 480 feet of berthing space with dolphins; shore moorings allow 1,000 feet of berthing space; 49 to 57 feet alongside; deck height, 23 feet; four hydraulic loading arms; one 1½-ton derrick; pipelines extend from berths to storage; receipt of crude oil; bunkering vessels; operated by Atlantic Richfield Co.

Berth 122: 770 feet of berthing space with dolphins; 40 feet alongside; deck height, 22 feet; 11 acres of paved open storage; receipt and shipment of automobiles, containers, and other utilized general cargo in foreign and domestic trade; various operators.

Inner Harbor (Channel Three):

Berth 46: 600 feet of berthing space with dolphins; 35 feet alongside; deck height, 14 feet; belt-conveyor system, with rotating stacker; receipt of gypsum rock by self-unloading vessels; operated by Domtar Gypsum America, Inc.

Pier 1, Berths 48–51: 1,798 feet of berthing space; 32 to 39 feet alongside; deck height, 17 feet; 1 acre of open storage; 112,000 square feet of covered storage; receipt and shipment of general cargo in foreign and domestic trade; various operators.

Pier 2, Berths 52–54: 1,312 feet of berthing space; 45 feet alongside (Berths 53 and 54), 35 feet alongside (Berth 52); deck height, 9½ feet (Berths 53 and 54), 10 feet (Berth 52); 136,000 square feet of covered storage; receipt of newsprint and lumber by vessel and barge; operated by Star Terminal Co., Inc.

Wharf and slip, Berth 59: wharf 230 feet long; slip 160 by 47 feet; 420 feet of usable berthing space; 19 to 20 feet alongside; deck height, 19 feet; open storage for 5,000 tons of rock; one 30-ton gantry crane with a 90-foot boom; receipt of rock; shipment of quarry supplies by barge; operated by Connolly-Pacific Co., division of L.G. Everist Co.

Pier, Berth 59: 500 feet of berthing space; 20 feet alongside; deck height, 15 feet; pipelines extend from pier to storage; receipt of bulk cement by self-unloading vessels; operated by Kaiser Cement & Gypsum Corp.

Inner Harbor (Channel Two):

Berth 69: 550 feet of berthing space with dolphins; 40 feet alongside; deck height, 16 feet; pipeline extends from berth to storage; receipt of vegetable oil, palm oil, coconut oil, and an occasional shipment of glycerine; operated by Procter and Gamble Manufacturing Co.

Berth 73: 325 feet of berthing space with dolphins; 42 feet alongside; deck height, 12 feet; pipelines extend from berths to storage; two hand-operated derricks with 24-foot booms; receipt of crude oil and petroleum products by vessel and barge; bunkering vessels and supplying bunkering barges; operated by Powerline Oil Co.

Berths 76–78: three offshore wharves; 1,645 feet of berthing space; 40 to 43 feet alongside; deck height, 14 feet; pipelines extend from berths to storage; 18 hydraulic loading arms; six 1-ton pneumatic derricks with 27-foot hose-handling booms; receipt and shipment of crude oil; petroleum products and petrochemicals; bunkering vessels; supplying bunkering barges; operated by Atlantic Richfield Co.

Berth 83: 600 feet of berthing space; 45 feet alongside; deck height, 14 feet; 13 acres of paved open storage; pipelines extend from berths to storage; receiving hopper with belt conveyor system; receipt of gypsum rock by self-unloading vessel; receipt of petroleum products and lumber; operated by Gold Bond Building Products, division of National Gypsum Co., Amorient Petroleum Co., Weyerhauser Co., and Fremont Forest Products.

Berths 84–86: 1,972 feet of berthing space; 53 to 57 feet alongside; deck height, 16 feet; pipelines extend from berths to storage; 12 hydraulic loading arms; receipt of crude oil; receipt and shipment of petroleum products; bunkering vessels; supplying bunkering barges; operated by Texaco, Inc.

Berth 101: immediately W of Heim Lift Bridge, S side of Cerritos Channel; 357 feet of berthing space with dolphins; 46 feet alongside; deck height, 13 feet; pipelines extend from berths to storage; receipt and occasional shipment of liquid chemicals; operated by Dow Chemicals, U.S.A.

The famous passenger liner QUEEN MARY, retired in 1967 and purchased by the Port of Long Beach, is moored on the NE side of Pier J, parallel to the skyline of the city of Long Beach. The ship is used as a floating museum, hotel, and convention center.

Supplies.–Fuel oil, water, and marine supplies can be had in any quantity at both Los Angeles and Long Beach. Fuel oil can be supplied at the oil docks or by barge.

Repairs.–Los Angeles Harbor is well equipped with marine repair plants; repairs of any size can be made. The largest drydock at Terminal Island has a lifting capacity of 22,000 tons, a length overall of 659 feet, a length on the blocks of 587 feet, a minimum clear width for vessels of 97 feet, and a maximum depth over the blocks of 27 feet. The drydock is of wood construction with six sections. The largest marine railway, at Berth 264 in the NE end of Fish Harbor, in East San Pedro, has a hauling power of 500 tons. There are a number of smaller facilities. There are no graving docks. The port is well equipped with wrecking and salvage facilities. A trained salvage crew and a corps of expert divers are ready at all times to render aid in any disaster to shipping along the coast and at distant localities.

Long Beach Harbor is also well equipped for marine repairs. A variety of barge cranes are available in the 40-to 275-ton capacity range. The U.S. Navy has 385-and 425-ton capacity floating cranes available for hire. Graving docks at the naval shipyard are available to merchant vessels in an emergency, provided the docks are not required for Navy use. The largest graving dock is 144 feet wide, 1,092 feet long with 39½ feet over the sill. There is a small marine repair plant on the S side of Channel Three in the Inner Harbor that has a floating dry dock with a lifting capacity of 3,000 tons. Vessels up to 300 feet have been accommodated at the plant. There are also several marine railways for small craft at Long Beach Harbor.

Communications.-Los Angeles and Long Beach Harbors have connections to the extensive freeway system which connects the cities of Los Angeles and Long Beach and their suburbs; four U.S. or Interstate highways extend from the area freeway system to the N, S, and E. The harbors are served by three major railroads and many airlines. The harbors are ports of call for many foreign and domestic steamship lines and by coastal barge lines.

While the Ports of Los Angeles and Long Beach are separate entities, their harbor facilities are closely interrelated.

Small-craft facilities.-The major small-craft facility in Long Beach is Long Beach Marina in Alamitos Bay. Other facilities in Long Beach Harbor are just inside the entrances to both Channel Two and Channel Three, and in Cerritos Channel at the Heim lift bridge. All repair facilities, supplies, fuel, moorage, and related yacht requirements may be had at individual private marinas or from other establishments in the Middle Harbor. Several boatyards are in Channel Two and Channel Three.

In November 1979, a marina was under construction on the N side of Queensway Bay W of oil Island Grissom. A submerged breakwater, marked at 50-foot intervals by lighted and unlighted buoys, is on the S and W sides of the marina.

Los Angeles Harbor has small-craft facilities on both sides of Cerritos Channel from the Heim lift bridge to East Basin, on the E side of East Basin, in Watchhorn Basin, and at the N end of West Channel. All the berths, fuel, supplies, and services required for small boats are available at the individual private marinas or may be obtained nearby.

Storm warning signals are displayed. (See chart.)

Chart 18746.-From Point Fermin the coast trends in a general W direction 6.5 miles to Point Vicente, and forms the N shore of San Pedro Channel, which is discussed in chapter 5. From Point Vicente the shoreline curves N. The coast is free of off-lying dangers and is well marked by kelp.

The Traffic Separation Scheme between Point Fermin and Point Conception is discussed earlier in this chapter.

Several submarine sewers extend 1.3 miles offshore near **Whites Point,** 1.3 miles NW from Point Fermin.

The buildings of the Marineland Oceanarium on **Long Point,** 0.7 mile SE of Point Vicente, are prominent from seaward. The tall, white observation tower at Marineland is very conspicuous. A 240-foot private pier is maintained as a private boat landing.

Point Vicente, 6.3 miles NW of Point Fermin, is a steep rocky cliff, 120 feet high, white and red in color, with red predominating. A rock awash is 250 yards SW from the point with kelp extending 100 yards farther to seaward. A small black 25-foot high pyramidal rock is close inshore 0.3 mile E of the point.

Point Vicente Light (33°44.5′N., 118°24.6′W.), 185 feet above the water, is shown from a 67-foot white cylindrical tower on the SW end of the point; a fog signal is at the station.

A **danger zone** for practice firing extends off Point Vicente. (See 204.197, chapter 2, for limits and regulations.)

Chart 18744.-**Palos Verdes Point,** 2 miles NNW of Point Vicente, is a bold, bluff point, 120 feet high, rising abruptly to the W extremity of Palos Verdes Hills. There are no dangers off the point, but heavy kelp extends 0.6 mile offshore and is marked by a lighted whistle buoy 0.7 mile W of the point.

Lunada Bay is a small bight on the S side of Palos Verdes Point. **Resort Point** forms the S side of this bay.

Flat Rock Point, 1.7 miles NE of Palos Verdes Point, is on the S side of Santa Monica Bay. A narrow spur protrudes from the otherwise rounded point. **Flat Rock,** 6 feet high, and **Bit Rock,** 5 feet high, are 175 yards and 250 yards, respectively, off the end of the spur. **Bluff Cove** is a shallow bight on the S side of Flat Rock Point. The beach is covered with boulders.

Santa Monica Bay is formed by the curving coast between Point Vicente and Point Dume. From Flat Rock Point to Santa Monica the shore is comparatively low with a sand beach backed by a continuous city area to the inland mountains. The depths of Santa Monica Bay are comparatively shoal, the 10-fathom curve in general lying about 1 mile from shore, except at Redondo Beach where a deep submarine valley, **Redondo Canyon,** heads close to the shore.

Malaga Cove, just N of Flat Rock Point, is used occasionally by fishing boats with local knowledge, but it is open to the prevailing W winds. Boats enter through a break in the kelp and anchor inside in 6 to 7 fathoms, with the S point of the cove bearing 207°.

King Harbor, 4.5 miles NNE of Palos Verdes Point, is a large small-craft harbor at **Redondo Beach.** The harbor is used mostly by pleasure craft and accommodates upwards of 1,400 boats.

Prominent features.–At the N end of King Harbor and about 200 yards inshore is a large powerplant with eight large smokestacks approximately in line and parallel with the beach. The four N stacks are the most prominent. The northernmost of these stacks is an excellent charted landmark. A private light is shown from atop the powerplant; the light is screened and has a restricted arc of visibility.

COLREGS Demarcation Lines.–The lines established for Redondo Harbor are described in 80.1140, chapter 2.

The entrance to the harbor is marked by a private light, a fog signal, and radiobeacon at the S end of the breakwater; another private light is shown on the end of a jetty close E. A lighted bell buoy is 230 yards SSW of the S end of the breakwater. Natural depths through the entrance are 27 to 30 feet with a depth of 8 feet in the three basins, except for an isolated depth of 6 feet in the northeasternmost channel of Basin 1. In March 1977, shoaling was reported on the S side of the entrance to Basin 3.

Storm warning signals are displayed. (See chart.)

Harbor regulations.–The harbor is administered by the city of Redondo Beach and is under the control of a harbormaster, who has an office near the entrance to Basin 2. Transients should contact the **harbormaster** for berth assignments. The harbor patrol operates from Basin 2. Both the harbor office and the patrol monitor VHF-FM channels 12 (156.60 MHz) and 16 (156.80 MHz).

Supplies.–There are two fueling docks that pump gasoline and diesel fuel, and most other small-craft supplies are available.

A yacht club is in Basin 3.

Repairs.–A boatyard here can handle craft up to 50 feet and 25 tons for all general repairs.

Caution.–The city of Los Angeles advises that under certain tidal conditions, underwater installations between King Harbor and Marina del Rey, seaward to 9 fathom depths, present possible hazards to surface navigation.

Sport fishing barges usually anchor 1 or 2 miles offshore during the summer; caution is advised to avoid them.

Submarine oil seepage.–About 1.5 miles off Redondo Beach, in the deep water of Redondo Canyon, there is a submarine oil seepage and the water surface is often covered with a film of petroleum. Gas bubbles have been reported in several locations in this vicinity. A second seepage 3.5 to 4 miles to the NW is more noticeable and more continuously in action. On calm days, globules and large blobs of oil have been seen projected clear of the water surface. Gas also escapes continuously in large bubbles often 3 to 6 inches in diameter.

Hermosa Beach and **Manhattan Beach** are between Redondo Beach and El Segundo; both have public fishing piers with fish havens covered 10 feet around their seaward ends. The pier at Hermosa Beach is about 1.3 miles N of Redondo Beach and extends about 350 yards from shore; a private fog signal is at the outer end. The Manhattan Beach pier, 2.5 miles N of Redondo Beach, extends almost 300 yards from shore

An oil company service pier is about 2 miles N of Manhattan Beach. There are submerged oil pipelines extending out N and S of the pier; mooring buoys off the pier and ends of the pipelines serve the tankers. On shore, just S of the pier, is a powerplant with four prominent stacks. The numerous pipelines N and S of the pier are marked by private buoys. A private lighted bell buoy is 1.5 miles W of the oil pier.

El Segundo, 1 mile inshore from the oil wharf, has extensive oil refineries. Nearly 100 large oil tanks on the high ground are prominent. An aerolight is 2.5 miles inshore at El Segundo. Two 334-foot striped stacks, 0.7 mile S, are very conspicuous charted landmarks.

A **restricted area** extends about 7 miles offshore at El Segundo. (See 162.195, chapter 2, for limits and regulations.)

Caution.–Mariners should use caution when navigating over the sewer outfalls that extend seaward from El Segundo. The existence of the submerged sewer outfalls present a hazard to all types of craft.

Marina del Rey, 7.6 miles NNW of Redondo Beach and King Harbor, is a large manmade small-craft harbor. It has a capacity for about 6,000 pleasure craft.

COLREGS Demarcation Lines.–The lines established for Marina del Rey are described in 80.1145, chapter 2.

A detached breakwater parallel to the shore is just to seaward of the jetties protecting the entrance channel.

Channels.–A dredged entrance channel leads NE from the detached breakwater for about 0.7 mile, then the harbor channel continues N for about 0.6 mile to the N end of the harbor. There are two openings between the jetties and the detached breakwater. In 1976–1977, the controlling depth in the dredged entrance and harbor channels was 10 feet, thence 10 feet was available in the basins off the harbor channel. In January 1982, shoaling to 5 feet was reported to extend about 150 feet off the end of the S jetty. The N and S ends of the detached breakwater and the outer ends of the jetties are marked by lights. A fog signal and radiobeacon are at the light on the outer end of the N jetty.

A **restricted area** governing navigation inside the detached breakwater has been established. (See 162.200, chapter 2, for limits and regulations.)

Traffic separation lanes have been established in the entrance channel to Marina del Rey. These lanes are marked by State Waterway Regulatory Buoys with the words "No Sail." All vessels under power, or power and sail, shall keep these buoys to their port when entering or departing the harbor. The center lane between the buoys is used by vessels solely under sail, both entering or departing the harbor.

A **special anchorage** is in the upper reach of the harbor channel. (See 110.1 and 110.111, chapter 2, for limits and regulations.)

Storm warning signals are displayed. (See chart.)

Coast Guard.–A search and rescue craft is stationed at the pier just S of the harbor office, on the E side of the bend in the entrance channel.

Harbor regulations.–The harbor is administered by the Los Angeles County Department of Small Craft Harbors, and is under the control of a **harbormaster,** who has an office on the E side of the bend in the entrance channel. Guest berths accommodating three or four boats alongside and three moorings for large yachts are maintained here. Transients should report to the harbormaster for berth assignment.

The Harbor Patrol operates from here, providing 24-hour fire and police patrol, with several high-speed police launches supervising the entire harbor. Radio frequency 2182 kHz and VHF-FM channels 12 (156.60 MHz), 16 (156.80 MHz), and 73 (156.675 MHz) are monitored on a 24-hour basis.

Supplies.–Marine supplies of all kinds can be obtain at most of the marinas and repair yards. Gasoline and diesel fuel are available at the fuel docks. Several yacht clubs are on the shores of the various basins. Medical facilities are available at the harbor, and a hospital is nearby.

Repairs.–There are two boatyards in the harbor that have hull and engine repair facilities. The largest lift can handle vessels up to 80 tons.

Fish havens, marked by private buoys, are about 1.1 miles W of the light at the N end of the detached breakwater.

About 1 mile N of the entrance to Marina del Rey is the 1,100-foot-long Los Angleles city public fishing pier at Venice; a fish haven covered 10 feet is around its seaward end. Lights mark the pier over its entire length, and a private fog signal is at the end. The Marina del Rey harbormaster advises that in dense fog the pier fog signal is occasionally mistaken for Marina del Rey entrance. The characteristics of these fog signals should be checked to avoid this error.

A **144°40'-324°40' measured nautical mile** is off Marina del Rey. The S range is two triangular white and orange markers located at the midpoint of Marina del Rey detached breakwater. The N range is an orange and white triangle located on the centerline of Los Angeles city public fishing pier.

Santa Monica, 3.5 miles NW of Marina del Rey, has a large pleasure pier that extends out to a depth of about 22 feet, but there is no water commerce. A private fog signal is sounded from the seaward end of the pier. A 0.3-mile-long breakwater, parallel to the beach and marked by private buoys off each end, is 200 yards off the outer end of the pier. A lighted bell buoy is moored SW of this breakwater.

The buildings and structures along the beach are prominent. Most conspicuous from offshore are the tall General Telephone Building with a red and white antenna on top, and the clock tower atop a bank building.

A **special anchorage** is off the pier. (See 110.1 and 110.110, chapter 2, for limits and regulations.)

Storm warning signals are displayed. (See chart.)

The 16-mile coast between Santa Monica and Point Dume is bold, rocky, and rugged. Steep cliffs rise abruptly from the water's edge, ascending gradually within 3 or 4 miles to the summits of the Santa Monica Mountain Range, about 3,000 feet high. The seaward termination of this range is at Point Mugu, 14 miles W of Point Dume.

Kellers Shelter, 9 miles W of Santa Monica at **Malibu Beach,** is an open bight offering protection from N and W winds in 2 to 7 fathoms, sandy bottom. A reef marked by kelp extends a short distance offshore about 0.5 mile W of the anchorage.

A fishing and pleasure pier, 700 feet long with 15 feet of water at its outer end, is on the W side of Kellers Shelter. Twin white buildings are prominent marks at the outer end of the pier. Private mooring buoys are maintained E of the pier for the use of sport fishing boats which leave for the nearby fishing grounds. Frequently the headlights of automobiles on the highway along the beach are directed toward the sea.

Paradise Cove, 2 miles NE of Point Dume, affords protection similar to Kellers Shelter. The anchorage is abreast the fourth break or arroyo in the cliffs from Point Dume, and is immediately outside the kelp line, in 6 to 7 fathoms, sand bottom, with Point Dume bearing 240°. Kelp should be avoided on account of possible dangers. A 400-foot sport fishing pier and several moorings for small boats are in the cove. A fog signal is atop a building near the end of the pier.

Point Dume is the seaward end of a rather low plateau that terminates in a dome-shaped head, about 200 feet high, rising from a bold rocky bluff. The bluff is reddish, with white cliffs E and W. A small bare rock is 150 yards S of the point, and a reef that uncovers is 150 yards farther out. Foul ground extends about 500 yards E of the reef. A lighted whistle buoy is 0.5 mile off the point.

Dume Canyon (see also chart 18740) is a submarine valley with extremely steep slopes running about 0.3 mile offshore from Point Dume, and extending NW roughly parallel to the beach. Moderately strong currents of a confused directional nature have been observed in the vicinity of this submarine valley.

Chart 18720.–The 14-mile coast between Point Dume and Point Mugu is very rugged, and there are no known outlying dangers. About 2 miles E of Point Mugu, on the beach at the foot of a very high bluff, is a 140-foot sand dune. This is quite prominent and can be made out on clear moonlit nights. The dune is charted as a "prominent slide."

Point Mugu, the seaward termination of the Santa Monica Mountains, is prominent on account of the lowland of the Santa Clara Valley to the W. The cuts and fills of the highway which skirt the shore from Point Mugu E are prominent. Aluminum-colored twin tanks, 1.5 miles NW of the point and on the W slopes of Laguna Peak, show well from SE through W. A pipeline runs from the tanks to a prominent white radar structure atop Laguna Peak. The tanks and the pipeline are marked by flashing red lights.

Weather.–Fog hampers visibilities most often from July through December, when the fog drops below 0.5 mile on about 5 to 8 days per month; September is usually the worst month. N through NE winds are common from October through March, while W winds prevail from April through September. While gales are infrequent, wind gusts have reached 50 to 60 knots from fall through spring. These strong winds often blow out of the ENE. Calm conditions are frequent all year round, but particularly from May through October.

Caution.–The U.S. Navy advises navigation interests and others that continuous guided-missile firing operations may take place in the Pacific Missile Range, Point Mugu, Calif., Sea Test Range, Monday through Sunday. The test area extends for 170 miles in a SW direction from Point Mugu and is up to 100 miles wide. The specific danger portions of the firing area are broadcast daily Monday through Friday at 0900 and 1200 on 2638 kHz and 2738 kHz.

A **danger zone** for Navy small-arms firing range extends about 2 miles offshore at Point Mugu. (See 204.201a, chapter 2, for limits and regulations.)

Mugu Canyon is a submarine valley with its head near Mugu Lagoon. The 50-fathom curve is about 0.5 mile offshore.

Santa Barbara Channel is discussed in chapter 5.

Chart 18725.–**Point Hueneme** (pronounced: y-nee-me), 22 miles WNW of Point Dume is low, rounding, and sandy. It is the outermost point of the low land of the Santa Clara Valley.

Point Hueneme Light (34°08.7'N., 119°12.5'W.), 52 feet above the water, is shown from a 48-foot white square tower on the point. A fog signal is sounded from the point about 70 yards SW of the light. A sewer outfall line, about 1.4 miles SSE of Point Hueneme Light, extends about 1 mile from shore.

Weather.–In the coastal waters from Point Hueneme to Santa Barbara, sea fog hampers navigation most often from July through October. It is generally more widespread and often more persistent than land (radiation) fog. Visibilities fall below 0.5 mile on about 5 to 10 days per month during these months; August and September are usually the worst.

Port Hueneme is an inland basin, about 1,300 feet long by 1,200 feet wide, located at the head of a submarine canyon, **Hueneme Canyon.** It is under the control of the U.S. Navy, Naval Construction Battalion Center. The SE part of the basin is leased to the Oxnard Harbor District and is operated as a deep-draft commercial terminal. The commercial terminal is used by cargo vessels; commercial and sport fishing craft; and oil company support vessels, which operate from here to offshore drilling rigs.

Prominent features.–The most prominent objects around the shores of the harbor are two red and white checkered elevated water tanks, one 0.8 mile and the other 1.3 miles N of the entrance channel; and a silver elevated water tank, 1 mile E of the entrance channel. Two red and white striped stacks at a powerplant, 2.4 miles SE of the harbor, are prominent, and the aerobeacon at Oxnard, 3 miles N of the harbor, is a good night mark.

COLREGS Demarcation Lines.–The lines established for Port Hueneme are described in 80.1150, chapter 2.

A **Safety Fairway** leading to the channel has been established. (See 209.138, chapter 2, for limits and regulations.)

Channel.–The dredged channel leads between two jetties and through a land cut into the basin. The outer ends of the jetties are marked by lights. A lighted bell buoy is about 800 yards SW of the outer end of the E jetty, and a 037° lighted range marks the channel.

In 1973, the controlling depths were 36 feet in the 2,300-foot entrance channel and 31 feet in the basin. The narrowest width of the entrance channel is 330 feet. However, because of prevailing fresh winds only one-way traffic is permitted for large ships. The pilots control the traffic direction.

Anchorage.–There is no anchorage area in the harbor basin due to space limitations. The best anchorage for deep-draft vessels is 1.8 miles W of the entrance to Port Hueneme in 55 feet with sand bottom. This location offers little protection in heavy weather.

Tides and currents.–The mean range of tide at Port Hueneme is 3.7 feet, and the diurnal range of tide is 5.4 feet. A range of about 9 feet may occur on days of maximum tides. The lowest low water is about 1.6 feet below mean lower low water. The harbor is not affected by tidal streams or currents.

Storm warning signals are displayed. (See chart.)

Pilotage.–All commercial vessels 300 gross registered tons and over, entering, leaving, or shifting within the Port of Hueneme, including the area of the Oxnard Harbor District, must be piloted by a port pilot duly licensed to perform the services of piloting vessels within the Port. The Oxnard Harbor District does not maintain pilots; licensed pilots are available on a 24-hour-a-day basis from the Commanding Officer, Naval Construction Battalion Center. As a service to all vessels, request for pilots may be made to the General Manager of the Oxnard Harbor District, who will act for the ship in obtaining necessary pilots. They can also be obtained by a message to "CO, CBCEN, PORHUE" or by direct request to the Port Services Officer, U.S. Naval Construction Battalion Center. Pilots board vessels from a tug about 213°, 2 miles from the W jetty light in about (34°06'57"N., 119°14'14"W.). The harbor pilots guard VHF-FM channel 16 (156.80 MHz).

Towage.–Tug service for the Port is furnished by the Commanding Officer, Naval Construction Battalion Center. Request for service may be made to the General Manager of Oxnard Harbor District, who will act as agent for the ship in forwarding them. Two 2,000-hp tugs are available on a 24-hour basis.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Agricultural quarantine.–All vessels from outside of California that dock at Port Hueneme, except those specifically exempt, must be inspected by the Ventura County Department of Agriculture. There is a local representative in Oxnard.

Harbor regulations.–The U.S. Navy exercises overall Port Control Authority; the Oxnard Harbor District is responsible for its commercial operations. The wharfinger is on duty at all times; his office is at the NW corner of Warehouse No. 2. Entrance to the Naval Construction Battalion Center is somewhat restricted, and no photography is permitted without clearance.

No garbage, waste, or refuse shall be discharged in any manner from any vessel in accordance with the California Administrative Code, a copy of which is available at the port's main administrative building.

Wharves.–Oxnard Harbor District has three 600-foot-long deep-draft berths (Wharf No. 1) and has a license agreement with the U.S. Navy for the use of seven additional deep-draft berths on an "as available" basis. There is also a shallow depth wharf at the W end of the port property adjacent to the entrance channel. It is 380 feet long with 12 feet to 15 feet alongside.

Wharf No. 1: 1,800 feet long; 35 feet alongside; deck height, 13 feet; two clear-span warehouses providing 80,000 square feet of covered storage; 10 acres of open storage; more than 36,000 additional square feet of warehouse and office space immediately adjacent to the waterfront; marine bunkering facility suitable for high freeboard vessels; a fish escalator; a cattle chute; a 50-ton vehicular weight scale; receipt of automobiles, steel products, general cargo, bananas, lumber, and fertilizer; operated by Oxnard Harbor District.

The port has complete facilities for LASH vessels.

Supplies.–Water and most marine supplies are available. Bunker fuel and diesel oil are obtainable.

Repairs.–Minor repairs may be made in the port. Machine shops in Ventura and Oxnard are qualified for normal voyage repair work.

Communications.–Oxnard has good rail, air, and highway connections with Los Angeles and points N.

Channel Islands Harbor, 1 mile NW of Port Hueneme and 5.8 miles SE of Ventura Marina, is a small-craft harbor. It is used by pleasure and sport fishing vessels and has existing berthing facilities for over 1,600 boats.

COLREGS Demarcation Lines.–The lines established for Channel Islands Harbor are described in 80.1155, chapter 2.

Channels.–The entrance to Channel Islands Harbor is between two jetties protected by an offshore breakwater. Each end of the breakwater and both the seaward and inshore ends of both jetties are marked by lights. A fog signal and radiobeacon are at the seaward end of the S jetty.

The area N of the entrance and E of the offshore breakwater is a sand trap and is subject to rapid and uncertain shoaling. The harbor entrance should be approached from S of the breakwater.

The entrance channel leads NE from the breakwater then turns N into the entrance basin. In March 1981, the midchannel controlling depth in the entrance channel was 13 feet, thence in 1976, 19 feet in the entrance basin and 10 feet in the inner basin.

A fish haven, marked by an unlighted buoy, is about 2 miles W of the breakwater.

Storm warning signals are displayed. (See chart.)

Coast Guard.–The Channel Islands Harbor Coast Guard Station is just S of the harbormaster's office. A search and rescue vessel is stationed here.

Harbor regulations.–The harbor is administered by the Ventura County Department of Airports and Harbors and is under the control of a **harbormaster**, who has an office on the E side of the harbor about 400 yards N of the first bend in the channel. The harbor office maintains guest berths for 35 craft. Transients should report to the harbormaster for berth assignments. The harbormaster guards 2182 kHz and VHF-FM channels 12 (156.60 MHz), 16 (156.80 MHz), and 73 (156.675 MHz) from 0600 to 2200. A harbor patrol boat operates from the office.

Supplies.–Gasoline and diesel fuel are pumped at a fueling dock on the E side of the harbor just N of the harbor office. Water, ice, and most marine supplies are available.

Repairs.–A marine repair yard on the E side of the channel, about 0.5 mile N of the harbormaster's office, has a fixed lift that can handle vessels up to 100 tons for hull and engine repairs.

A **147°51'–327°51' measured nautical mile** is off the breakwater and beach just N of the harbor entrance. The S range is marked by the breakwater S light and the S jetty light. The N range is marked by less visible poles on the beach.

A row of cottages extends NW along the beach for 2 miles from Point Hueneme. From the point, low sand beaches and dunes trend NW for 9 miles to the mouth of **Ventura River.**

A striped 209-foot stack having a bright flashing red light on top is 0.6 mile N of **Mandalay Beach** and is conspicuous throughout the area. A private lighted buoy is 1.1 miles W of the stack, and a group of mooring buoys are about 0.3 mile E of the lighted buoy. A submarine pipeline runs from the mooring buoys to shore.

Ventura is 8.5 miles N of Point Hueneme on **Pierpont Bay.** It has a 1,960-foot fishing pier with about 19 feet of water at the outer end and about 18 feet at the inner end of the 250-foot loading face.

Freshwater is piped to the pier, and gasoline is available in the town.

A submarine pipeline just W of the pier goes S from the shore, 0.7 miles, to several large mooring buoys. The pipeline is used to load gasoline and fuel oil into tankers. A sewer outfall is just W of this submarine pipeline, and an abandoned submarine pipeline is just E of the pier.

Two fish havens are about 2.3 miles SW and 1.7 miles S, respectively, from Ventura Pier. The outermost fish haven is marked by unlighted buoys.

Small craft may anchor anywhere in Pierpont Bay, but the anchorage is unprotected and is not recommended except for short day use. Boats may obtain moorage at Ventura Marina.

The most prominent features around Ventura are the lighted microwave tower, atop a hill 1.8 miles NE of the seaward end of Ventura Pier, and the tall Holiday Inn Motel (sign lighted at night), about 300 yards W of the pier. Also prominent are the railroad trestle crossing Ventura River, just W of town, and **Padre Junipero Serra's Cross,** on a 350-foot hill immediately NW of the center of town. There are several aluminum-colored tanks and many oil derricks high up the slopes of the hills NW of town.

Ventura Marina, 6.7 miles N of Point Hueneme and just N of Santa Clara River, is a small-craft harbor used mainly by pleasure craft. It has existing berthing facilities for over 500 boats.

COLREGS Demarcation Lines.–The lines established for Ventura Marina are described in 80.1160, chapter 2.

A submarine pipeline is between the shore, just S of the entrance to the marina, and mooring buoys are 0.5 mile WNW of the entrance to the marina.

The entrance to Ventura Marina is between two jetties protected by a 1,500-foot detached breakwater. Each end of the breakwater and the seaward end of both jetties are marked by lights. A fog signal and radiobeacon are at the S jetty.

When a rough sea is from a W direction, dangerous breakers often roll into the entrance. Extreme caution must be exercised to prevent foundering under these conditions. This dangerous entrance condition occurs mostly in the winter when the prevailing winds are from the W. Inbound and outbound boaters are advised by local interests to run a direct course between Ventura Marina Entrance Lighted Whistle Buoy 2 and the breakwater entrance.

Channels.–The dredged entrance channel leads NE between the jetties then turns E into the harbor. The channel and approach are subject to considerable shoaling. In November 1981, the entrance channel had a midchannel controlling depth of 15 feet. The private buoys in the entrance channel and harbor are not charted because the positions are changed frequently due to the shifting shoals. Mariners are advised to exercise extreme caution and to contact the harbormaster for the latest channel and harbor conditions prior to entering. In April 1981, the area N of the entrance and E of the breakwater was very shoal.

A channel leads NE from the N part of the harbor to a private waterfront home development called **Ventura Keys.** In February 1978, depths of 8 to 9 feet were reported in the development.

Harbor regulations.–Ventura Marina is administered by the Ventura Port District and is under the control of a **harbormaster,** who has an office on the point N of the entrance basin. Transients should report to the harbormaster for guest slip assignments. The harbormaster monitors VHF-FM channels 12 (156.60 MHz), 16 (156.80 MHz), and 73 (156.675 MHz) on a 24-hour basis. A harbor boat also operates on a 24-hour basis.

Supplies.–Gasoline and diesel fuel are pumped at a fueling dock E of the harbor office. Water, ice, and marine supplies are available. A yacht club is on the shores of the harbor.

Repairs.–A boatyard, E of the harbor office, has a portable mobile lift that can handle vessels up to 25 tons for hull and engine repairs. Electronic service is also available.

Storm warning signals are displayed. (See chart.)

From Ventura River, the **Santa Ynez Mountains** extend to Point Conception and Point Arguello. For 11 miles W from the river to Rincon Point the coast is very rugged; elevations of over 2,000 feet being found within 1 mile of the beach. The dangers do not extend over 0.5 mile from the beach which is well fringed with kelp. Between Ventura and Santa Barbara are several small towns, and the highway and railroad skirt the shore; retaining walls are a common feature.

Pitas Point, 5.5 miles NW of Ventura, is the first bold point W of Ventura River. A very steep gulch is on the W side. E of the point is a mile of beach cottages. High on the steep slopes above the cottages are the derricks and tanks of an oil field. Aluminum-colored tanks and oil-processing plants are prominent a mile E of the point.

Punta Gorda, 9 miles NW of Ventura, is low at its outer extremity, but rises rapidly to prominent **Rincon Mountain.** E of the point is a long pier supporting several oil pumps. Oil tanks are conspicuous on the outer end of the pier. Tanks and numerous derricks are along the highway just E of the pier. W of this pier a causeway extends S from Punta Gorda for 0.5 mile to an artificial island used for oil operations. A private light and fog signal are on the island.

Rincon Point, 11 miles NW of Ventura, is low and sandy. **Sand Point,** 3.5 miles W of Rincon Point, is low and rounding, with the narrow opening to **El Estero,** a lagoon of no importance lying close under and E of it. A rock that uncovers is 550 yards offshore from Sand Point. Oil-drilling platforms are off Sand Point.

A Standard Oil installation is prominent on the E side of **Carpinteria,** 8 miles E of Santa Barbara. A submerged pipeline leads to offshore oil drilling platforms and to mooring buoys about 0.6 mile offshore where tankers are loaded. A pier is used to load support boats operating to and from the oil platforms. Many storage tanks are back of and on each side of the pier. One tank with an aluminum-colored dome may be seen from seaward.

Ortega Hill, just W of **Summerland** and 18 miles NW of Ventura, is 250 feet high and conspicuous because of the extensive cuts for the highway; from offshore it has the appearance of a large slide.

Santa Barbara, 29 miles NW of Point Hueneme, is a resort city and popular yachting harbor. The harbor is used mostly by pleasure craft and fishing vessels. There are over 700 slips and 50 permanent moorings in the harbor.

Santa Barbara Light (34°23.8'N., 119°43.3'W.), 142 feet above the water, is shown from a 24-foot white tower about 2 miles W of the harbor entrance. **Lavigia Hill,** 0.6 mile NE of the light is 459 feet high and the distinguishing feature in approaching Santa Barbara from the E or W.

Santa Barbara Point, 1 mile E of the light, is a high cliff at the SE limit of the narrow tableland extending from Lavigia Hill. The point is the beginning of a sand beach extending 0.6 mile E to **Point Castillo,** the W point of the breakwater forming Santa Barbara Harbor.

Conspicuous landmarks are the neon-lighted hotel tower on the beach 1 mile E of the town, the several radio towers, and the many residences on the hillsides back of the town. At night the lights of Santa Barbara are prominent from the channel, but they are obscured from the W by Lavigia Hill.

COLREGS Demarcation Lines.–The lines established for Santa Barbara Harbor are described in 80.1165, chapter 2.

The harbor has a 500-yard breakwater extending NE from **Point Castillo** to an extensive sandbar which forms the S side of the entrance to the harbor. **Stearns Wharf** about 175-yards N of the sandbar, forms the N side of the entrance to the harbor. A groin, about 125 feet long, extends S from the N side of the harbor. A light marks the outer ends of the groin and Stearns Wharf; the breakwater is marked by a light where it connects with the sandbar. At night, sometimes the lights are difficult to see against the background of city lights. A fog signal is at the light on Stearns Wharf. A radiobeacon is 340 yards W of the groin light.

Channels.–A dredged entrance channel leads NW between the breakwater and Stearns Wharf then turns SW into the harbor. In January 1981, shoaling to 7 feet was reported in the channel to the city dock at the SW end of the harbor. The channel is marked by buoys. The harbor buoys are not charted because their positions are frequently changed. The entrance and harbor are subject to rapid shoaling. The harbormaster advises that the entrance channel has a tendency to shoal after SE storms. Mariners should contact the harbormaster on 2182 kHz or on VHF-FM channel 16 (156.80 MHz) for channel conditions and assistance in entering.

Anchorage.–A special anchorage area is in the basin behind the breakwater. (See 110.1 and 110.115, chapter 2, for limits and regulations.) Anchoring inside the harbor and in the sewer line area E of Stearns Wharf is usually prohibited by the harbormaster. Anchorage may be had inside the kelp, but large vessels should anchor outside of it in better holding ground.

Caution.–The long sandbar N of the breakwater light is inconspicuous on a high-tide night, but the masts of boats moored in the harbor are quite visible over the breakwater. The **harbormaster** reports that these circumstances have caused several groundings on the sandbar when strangers making for the harbor at night failed to identify the breakwater light, failed to see the sandbar, but sighted the masts in the harbor and steered toward them, consequently going hard aground on the sandbar. The shoreline of the sandbar is subject to continual change. **Caution** should be exercised when entering at night; the buoyed channel should be carefully followed.

Weather.–Fog plagues the harbor most often from August through November, when it reduces visibilities to less than 0.5 mile on 4 to 7 days per month. Morning is usually the worst time. Winds are often calm at Santa Barbara. Winds of 3 knots or less occur 18 percent of the time or more year round, and 25 to 40 percent of the time from September through March. The sea breeze helps reduce this percentage. These spring and summer winds are mainly out of the E through WSW. NE winds, common throughout the year, are the most frequent winds from November through February, though a distant second to calm conditions.

Storm warning signals are displayed. (See chart.)

Coast Guard.–A Coast Guard rescue vessel is stationed at the city pier in the SW part of the harbor, and a Coast Guard Group Station is on the bulkhead in the N part of the harbor.

Harbor regulations.–Santa Barbara Harbor is administered by the City of Santa Barbara Harbor Department and is under the control of a **harbormaster,** who has an office at the SW corner of the harbor. Transients should report to the harbormaster for guest slip assignments. The office monitors VHF-FM channel 16 (156.80 MHz) and 2182 kHz.

The harbor police are on 24-hour duty, and they monitor VHF-FM channel 16 (156.80 MHz). Strangers desiring assistance entering the harbor will be assisted by a patrol boat as needed when requested.

Stearns Wharf has 18 to 24 feet alongside. Diesel fuel, gasoline and water are available on the wharf.

Supplies.–Marine supplies are available.

Repairs.–There is a boatyard on the SW side of the basin that can handle craft up to 25 tons and 50 feet for hull and engine repairs. A small floating drydock in the harbor can lift craft up to 20 tons for hull maintenance and repair. And there are several boat builders and repair yards in the city of Santa Barbara.

Communication is by rail, motor vehicle, and by airplane. The Santa Barbara Municipal Airport is at **Goleta,** 7 miles W of the harbor.

A **081°58′–261°58′ measured nautical mile** is 300 yards E of Stearns Wharf. The ranges are marked by white daymarks on telephone poles.

Chart 18721.–The 8-mile coast from Santa Barbara W to Goleta Point consists of bluffs 30 to 100 feet high with short stretches of sand beach and is fringed with kelp 0.2 mile offshore.

Goleta Point, 6.2 miles W of Santa Barbara Light, is low and terminates in a cliff about 30 feet high. The buildings of the University of California at Santa Barbara are conspicuous just N of the point. The aerolight 1.5 mile N and the two lighted radio towers 1.5 mile NE of the point are good marks at night. A short pleasure wharf is in the bight E of the point.

The 32-mile coast from Goleta Point to Point Conception is more rugged than that E. **Canada de la Gaviota,** 12 miles E of Point Conception, is a conspicuous break in the mountains back of this coast. A railroad skirts the shore over trestles and embankments which cross the mouths of numerous gulches and arroyos. The kelp grows quite heavily, and in some places extends over a mile offshore. The Pacific Coast Highway parallels the coast from Santa Barbara to Gaviota, where it turns inland.

Oil well production heads covered 6 fathoms or more and submerged pipelines to shore extend as much as 3 miles offshore between Goleta Point and Point Conception. Several oil-well structures in the area are lighted and equipped with fog signals.

Coal Oil Point, 1.8 miles W of Goleta Point, is low and may be distinguished by the strong odor of petroleum discharged by a spring. This odor is noticeable over 2 miles offshore.

Ellwood oil field, 2 miles NW of Coal Oil Point, extends more than 1 mile along the shore and is marked by many tall derricks. Several large tanks may be seen on the bluffs above the beach. Large tankers call frequently for oil at the submarine pipelines off the shore. The moorings are in about 10 fathoms, sandy bottom. Some piles, of former piers, may remain in the waters in this vicinity. Passage without local knowledge is not advisable.

A rock covered 15 feet is 3.7 miles W of Coal Oil Point and 0.9 mile offshore; it is surrounded by kelp. A reported rock covered 4 fathoms is 3.3 miles S of **San Augustine.** This rock is the outermost danger along the N side of the Santa Barbara Channel.

Capitan, 7.5 miles W of Coal Oil Point, is in a small bight which offers little protection to small craft. A lone tank stands on a bare hill 500 feet high and 0.3 mile inland.

Refugio Beach at **Orella,** 2.5 miles W of Capitan, is a State Park for camping at the mouth of the canyon. A small bight here offers some protection for small boats in northwesterly winds in about 15 feet.

Oil is loaded from a submerged pipeline at **Gaviota,** 13.5 miles E of Point Conception. A number of large green storage tanks mark the inshore end of the pipeline. About 1 mile W of Gaviota is a State beach park with a 545-foot pleasure-fishing pier. An electric hoist for launching skiffs is available. The railway trestle along the beach is quite prominent.

Cojo Anchorage, 1.5 miles E of Point Conception, affords protection off the mouth of the Cojo Valley from moderate W and NW winds. The suggested anchorage is opposite a culvert under the railroad tracks in 5 to 10 fathoms, hard sandy bottom. The cove 1.7 miles E of this anchorage known as Little (Old) Cojo, is foul and affords little protection.

Point Conception, 118 miles NW of Point Fermin and at the W end of Santa Barbara Channel, is a bold headland 220 feet high that marks an abrupt change in the trend of the coast. There is comparatively low land immediately behind it. At a distance from N or E, it usually looks like an island.

Point Conception has been called the **Cape Horn of the Pacific** because of the heavy NW gales encountered off it during the passage through Santa Barbara Channel. A marked change of climatic and meteorological conditions is experienced off the point, the transition often being remarkably sudden and well defined. When the northwesterly winds are strong they blow down the canyons between Point Conception and Capitan and cause heavy offshore gusts.

Point Conception Light (34°26.9′N., 120°28.2′W.), 133 feet above the water, is shown from a 52-foot white tower behind a building near the W part of the point; a fog signal is at the station. A low black rock, nearly awash at high tide, is 220 yards offshore, SW of the light.

Danger zones extend offshore from Point Conception to Point Sal. (See 204.202, chapter 2, for limits and regulations.)

From Point Conception, the coast trends in a gentle curve NW for 12 miles to Point Arguello and consists of bold rocky cliffs, 100 to 400 feet high. The coast railroad runs along these cliffs and through several tunnels.

The 100-fathom depth curve off Point Arguello, and to a lesser extent off Point Conception, is characterized by a succession of indenting deeps or gorges. In following the curve during thick weather with an echo sounder, these submarine features should be found extremely useful.

Espada Bluff is a prominent cliff 378 feet high, 5.5 miles NNW of Point Conception. The cliffs on each side drop sharply to less than 100 feet in height.

Tranquillon Mountain, near the seaward end of the Santa Ynez Mountains, is prominent in clear weather. It terminates in Rocky Point, Point Arguello, and Point Pedernales.

Rocky Point, 1.2 miles S of Point Arguello, has numerous detached rocks extending in some cases 300 yards offshore.

Point Arguello is a narrow, jagged, rocky projection, extending about 800 yards W of the general trend of the coast. An outlying rock is about 200 yards seaward. The extremity of the point overhangs the water's edge, and about 200 yards inshore the point is nearly divided by gullies on the N and S sides. These form a saddle which, from N and S, looks like two heads. **Point Arguello Light** (34°34.6'N., 120°38.8'W.), 124 feet above the water, is shown from a 48-foot pole on the W end of the point. A fog signal is 316 yards 270°, and a radiobeacon is 283 yards 060° from the light pole.

Weather.–Off Point Arguello, sea fog becomes a persistent and frequent navigational hazard. The cool California Current is responsible for a sudden increase in fog frequencies. These fogs are often thick, and Point Arguello is considered by mariners to be one of the most dangerous areas along the coast. The observing station at Point Arguello (371 feet above mean sea level) records an annual average of twice as many days with visibilities less than 0.5 mile as at any location farther S. From June through October, visibilities drop below 0.5 mile on about 12 to 20 days per month; July and August are the worst months. During August the fog signal is operating more than 30 percent of the time, compared to 17 percent at nearby Point Conception.

Chart 18687.–Lake Mead, Arizona-Nevada, is a National Recreation Area on the **Colorado River** impounded by **Hoover Dam** (36°01.0'N., 114°44.2'W.). **Restricted** and **anchorage** areas established by Federal regulations are in Lake Mead. (See 110.1, 110.127, and 162.220, chapter 2, for limits and regulations.) Additional information may be obtained from the local office of the National Park Service, U.S. Department of the Interior, 601 Nevada Highway, Boulder City, Nev. 89005.

Occasionally Commander, Eleventh Coast Guard District, publishes a Colorado River Local Notice to Mariners which contains information concerning boating events, boating safety, bridge construction and lighting, aids to navigation, and anchorages on the Colorado River, Lake Mead National Recreation Area, and Glen Canyon National Recreation Area. These notices may be obtained, free of charge, by making application to Commander, Eleventh Coast Guard District, Union Bank Building, 400 Oceangate, Long Beach, Calif. 90822.

5. CHANNEL ISLANDS, CALIFORNIA

This chapter describes the eight **Channel Islands** that extend for 130 miles in a NW direction off the coast of southern California from San Diego to Point Conception. They include the four islands of the southern group–San Clemente, Santa Catalina, San Nicolas, and Santa Barbara; and the four islands of the northern group also referred to as the **Santa Barbara Islands**–Anacapa, Santa Cruz, Santa Rosa, and San Miguel. Also described are the passages and channels between these islands including Outer Santa Barbara Passage, San Pedro Channel, Anacapa Passage, Santa Cruz Channel, San Miguel Passage, and Santa Barbara Passage, and Avalon Bay, the most active harbor in the area, as well as many smaller harbors and landings.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1105, chapter 2.

Chart 18022.–San Clemente, San Nicholas, and San Miguel Islands are military reservations and off limits to the public.

Santa Barbara and Anacapa Islands form the Channel Islands National Monument and are under the supervision of the National Park Service, Department of the Interior. The Monument was created in 1938 to protect the extensive flora and fauna on the islands.

The remaining three islands, Santa Catalina, Santa Cruz, and Santa Rosa, are privately owned, and permission of their owners must be obtained prior to going ashore, except for Avalon on Santa Catalina Island where a landing permit is not required. Regulations issued by the owners of these islands are furnished with the permits.

In the approach from the S, several banks are encountered before reaching the Channel Islands. **Sixtymile Bank,** 62 miles SSW of Point Loma (32°39.9'N., 117°14.5'W.), has a least depth of 53 fathoms over it.

Channel Islands National Marine Sanctuary has been established to protect and preserve the marine birds and mammals, their habitats, and other natural resources in the waters surrounding the northern Channel Islands and Santa Barbara Island. The sanctuary encompasses the waters within 6 miles of Santa Barbara Island and the northern Channel Islands (Anacapa, Santa Cruz, Santa Rosa, and San Miguel Islands), including Castle and Richardson Rocks. Recreational use of the area is encouraged. Regulations governing the use of the sanctuary are contained in 15 CFR 935. Any person in possession of a valid permit may conduct in the sanctuary the specific activity designated in the permit, including any activity specifically prohibited by the regulations, if such activity is (1) research related to the resources of the sanctuary, (2) to further the educational value of the sanctuary, or (3) for salvage or recovery operations.

Permit applications and requests for copies of the regulations shall be addressed to the Assistant Administrator for Coastal Zone Management, Sanctuary Programs Office, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, NW., Washington, D.C. 20235.

Local Magnetic Disturbance.–Differences of 4° or more from the normal magnetic variation have been observed within a radius of 8 miles of Sixtymile Bank.

Chart 18740.–Bishop Rock, in about 32°27'N., 119°08'W. and which the clipper ship BISHOP struck in 1855, is awash and marked by a lighted whistle buoy. The rock, about 40 miles SW of San Clemente Island, is the farthest outlying danger along the coast. A wreck, covered ½ fathom and about 0.1 mile SE of the rock, is the shallowest point on **Cortes Bank.** The currents are largely nontidal in character; velocities between 1 and 2 knots have been measured. These currents cause considerable swell, and even in moderate weather the sea usually breaks at this rock.

The area for about 2.5 miles ESE of Bishop Rock should be avoided because of the broken bottom. Deep-draft vessels should also avoid a 9-fathom spot 5 miles WNW of the rock where the bottom is extremely broken, although no breakers have been reported.

Tanner Bank covers an area about 12 miles long in a WNW direction and about 5 miles wide. The least survey depth over it is 9 fathoms. The NW end of the bank is about 28 miles SE of San Nicolas Island.

A bank covered 45 to 70 fathoms is 18 miles NW of Tanner Bank. The bank extends 9 miles in a NW-SE direction and has an average width of 2 miles. The bottom is hard with fine gray sand and shells. The bank is fished extensively during the winter.

Chart 18762.–San Clemente Island, 43 miles SSW of Point Fermin and 57 miles WNW of Point Loma, is 18 miles long in a NW direction and 4 miles wide at its widest part, and reaches an elevation of 1,965 feet. The island is a U.S. Naval Reservation and is closed to the public. Vessels including yachts and fishing craft are warned that the vicinity of the island may be dangerous at any time because of naval activities, including gunfire, bombing, and rocket fire.

Local magnetic disturbance.–Differences of as much as 5° from normal variation have been observed up to 3 miles offshore along the N, E, and S coasts of the island.

The top of the island appears as a tableland from a distance. A prominent white radar dome (32°53.1'N., 118°27.0'W.), on the highest part of the island, is visible from both the E and W sides of the island.

The NE side of the island is bold, with rocky cliffs. The water is generally deep close inshore, and kelp grows close to the beach. On this side of the island a prominent white rock is close inshore, 6 miles NW of Pyramid Head. On the beach behind this rock is a freshwater spring, the only one available during the dry season.

The SW side of the island is more irregular, but it is lower and has more gentle slopes. Here the kelp extends several hundred yards offshore, and generally to or beyond the 10-fathom curve. Rocks are numerous close inshore and inside the kelp, but outside the kelp line, the bottom slope is more gradual than on the other side of the island, and there are many places where vessels might anchor safely in the lee of the island during the NE storms, known as the Santa Anas.

Seal Cove, on the SW side of the island midway between the two ends, affords a boat landing and indifferent anchorage for small craft in NW weather.

Outer Santa Barbara Passage lies between San Clemente and Santa Catalina Islands.

Chart 18764.–China Point is the SW extremity of San Clemente Island and on the W side of Pyramid Cove. A light is shown from a white pyramidal structure on the point.

Pyramid Cove, the deep bight in the S end of San Clemente Island, is used as a naval shore bombardment area and included in a **danger zone.** (See 204.200, chapter 2, for limits and regulations.) The cove, closed to the public, offers protected anchorage in 10 fathoms or more in NW weather to authorized vessels and vessels in distress. Vessels should not enter the kelp as there are indications of other dangers in addition to those already charted. Some swell makes into the cove most of the time. Authorized landing on the beach is usually not difficult, but can be extremely hazardous because of unexploded ordnance. A target barge is permanently moored in the W part of the cove about 2.3 miles 260° from Pyramid Head Light.

Pyramid Head, the SE point of San Clemente Island and the E side of Pyramid Cove, is about 900 feet high, sharp, jagged, and prominent. A light is shown from a white pyramidal structure on the head.

Chart 18763.–Wilson Cove, on the NE shore of San Clemente Island, 15.5 miles NW of Pyramid Head, is a fair anchorage in the prevailing W weather, but is uncomfortable at times as the swells make around the point from the NW. A strong wind usually blows down off the hills in the afternoon. A **restricted anchorage area** and a **naval restricted area** are in the vicinity of the cove. (See 110.218 and 207.614, chapter 2, for limits and regulations.)

Three lights shown from white pyramidal structures and a lighted range are in the vicinity of Wilson Cove. One is on the hill on the SE side of the cove, another 2 miles S of the cove, and the other 1 mile N of the cove. The range lights are in line with the Navy pier on bearing **198°**. A fog signal is on the end of the pier.

Wilson Cove should be approached from the NE to avoid the numerous buoys N and S of the cove.

The buildings on the hill overlooking Wilson Cove are prominent from the SE. The best anchorage for small craft is in the lee of the kelp making off from a point nearly a mile NW of the pier.

The Navy pier in the middle of Wilson Cove is of steel construction and extends 550 feet from shore. A landing section at the outboard end of the pier is 38 feet wide and 210 feet long, and has a deck height of 18 feet. Depths alongside the landing section range from 14 feet inboard to 24 feet outboard. The two breasting mooring buoys on each side opposite the landing should be used to avoid danger of damage from surge. Time of the tide is about the same as that for Los Angeles. The mean range of tide is 3.5 feet.

Northwest Harbor, on the NW end of the island, affords shelter in S weather and is a comfortable anchorage in the prevailing W weather, as the large beds of kelp and the low islet to the N of the anchorage afford protection. It is open N and is unsafe in heavy NW weather.

A light is shown from a white pyramidal structure on the headland at the N end of San Clemente Island.

A line of rocks extends W from the NW extremity of San Clemente Island, terminating about 0.4 mile off the point in bold and rocky **Castle Rock.** A **danger area** for aerial bombing, rocket firing, and strafing extends 300 yards around this prominent islet.

West Cove, on the NW side of San Clemente Island, 1.5 miles SE of Castle Rock, offers some shelter from Santa Ana winds; holding ground is good.

A **danger area** extends for 0.2 to 1.5 miles off the W coast of San Clemente Island for 3.2 miles S of West Cove. (See 204.200a, chapter 2, for limits and regulations.)

A **150°-330° measured nautical mile** is 1.3 miles S from West Cove. The 70-foot towers of the front and rear markers on San Clemente Island are more than 500 feet high.

Chart 18757.–Santa Catalina Island, 18 miles S of Point Fermin, is 18.5 miles long in a SE direction and has a greatest width of 7 miles. The island is privately owned, and landing permits, except at Avalon, are required. Arrangements for permits and the leasing of the many mooring buoys found throughout the area may be made through the Catalina Cove and Camp Agency at Two Harbors; a landing fee is collected.

The island is almost divided by a deep N cut about 6 miles from the W end. The cut forms coves less than 0.5 mile apart at their heads, and because the isthmus separating these coves is low, the island appears as two from a few miles off. Rugged and mountainous, the island has steep, precipitous shores intersected occasionally by deep gulches and valleys, and is covered with a thick growth and some scrub oak. The highest peak, 2,125 feet, is near the middle of the E part of the island. Sheep and cattle are raised to some extent on the island.

Much of the N shore is free from kelp, but the S side in general has a narrow fringe of kelp close to the beach. The island rises abruptly from deepwater, the 30-fathom curve being close inshore. Most of the dangers in the approaches to the island are inside the kelp.

Lights are shown from white pyramidal structures on the S end, **Long Point** (E side), and **West End** (NW point) of the island.

Ribbon Rock, on the W side of Santa Catalina Island, 2.9 miles SE of West End, shows as a dark vertical rock wall with a gigantic ribbon of quartz veining that is visible for many miles.

Farnsworth Bank, 9.2 miles SSE of West End and 1.6 miles offshore, has a least known depth of 9 fathoms over it.

Shelter from Santa Ana winds can be had by anchoring in the bight near the **Palisades** on the S side of the island, 2 to 3 miles NW of the S extremity.

Two prominent rock quarries are on the E side of the island; one is 1.5 miles S of Avalon Bay, and the other is 1 mile SE of Isthmus Cove. Private lighted mooring buoys are close off the quarries.

White Cove, 3.5 miles NW of Avalon, affords anchorage in 8 fathoms and provides almost the same protection as that found at Avalon. The beach in White Cove is known as **Whites Landing.**

COLREGS Demarcation Lines.–The lines established for Santa Catalina Island are described in 80.1105, chapter 2.

Chart 18759.–Avalon Bay, on the N shore of Santa Catalina Island, 2.5 miles from its SE extremity, is entered between **Casino Point** breakwater on the N and the breakwater, known locally as **Cabrillo Peninsula,** extending from **Bathhouse Point** on the S. The breakwaters are marked by lights on their seaward ends.

The small bay has depths of 2 to 13 fathoms; a depth of 20 fathoms is immediately outside the points of the bay. The **harbormaster** reports that shelter is excellent in the harbor during SW weather and good during NW and SE weather if the wind does not exceed 20 knots. The breakwater provides limited protection in the NW and SE ends of the harbor during NE Santa Ana winds that occasionally blow during the fall and winter. A **special anchorage** is in the bay. (See 110.1 and 110.105, chapter 2, for limits and regulations.)

A radiobeacon and a large white circular building, brilliantly illuminated for about half the night during the summer, are on Casino Point. **The Carillon,** easily identified, is an illuminated white concrete tower 0.2 mile SW of Casino Point.

Avalon, an incorporated city and part of Los Angeles County, is an extensive resort and the principal settlement of the island. Daily ship and air service is maintained with San Pedro and Long Beach with summer service to Newport. A road along the beach extends some distance on each side of the cove, and at night the lights along this road are conspicuous from San Pedro Channel.

The bay is extremely popular as a yacht haven and vacation resort during the summer. Yachting and fishboat supplies, limited engine and underwater repair facilities, and towing service are available at Avalon.

A pleasure pier with various concessions and equipment rental firms and a 2-ton hoist are in the S part of Avalon Bay. Transportation Wharf, a 450-foot concrete pier with reported depths of 60 to 20 feet alongside, and floating docks with reported depths of 20 feet alongside are on the E and W sides of the S breakwater (Cabrillo Peninsula), respectively. Transportation Wharf is used by passenger vessels that operate to the mainland, and is available to any oceangoing common carrier by prior arrangement with the harbormaster; the seaplane ramp, SE of and adjacent to Transportation Wharf, is also available to commercial seaplanes. The floating docks are used for cross-channel and local commercial carriers. The Transportation Wharf is open to the sea and subject to surge even in seemingly clear weather. Further, circular currents are reported off the N end of the wharf. Caution is advised.

In 1969, **a seaplane landing area** was reported SE of Transportation Wharf.

Yachts and other small craft moor to buoys in the bay; there are no alongside berths. The mooring buoys in the bay are either privately owned or owned by the City of Avalon and leased to private boatowners. The **harbormaster,** located on the pleasure pier, makes all temporary mooring assignments. A harbor boat will meet visiting yachts upon arrival and will escort them to a mooring if desired; a fee is collected for this service. Shoreboat and garbage collection services are available throughout the day.

Avalon is the only place on Santa Catalina Island that does not require a landing permit.

Emergency rescue service is available at Avalon. The fire and rescue boat can be contacted through the Coast Guard or the harbormaster at Avalon and monitors 2182 kHz and VHF-FM channel 16 (156.80 MHz) from 0900 to 1700 daily; the call sign is "Baywatch."

Weather information for Avalon is broadcast from Avalon by commercial radio station KBIG (740 kHz) daily on the hour during daylight hours.

Storm warning signals are displayed. (See chart.)

A **small-craft anchorage** is in Descanso Bay, just N of Casino Point. (See 110.1 and 110.216, chapter 2, for limits and regulations.) In 1978, it was reported that the holding ground was poor, and that heavy concentrations of kelp made anchoring difficult.

Isthmus Cove, on the N shore 6 miles from the

W end of the island, affords shelter for small vessels in S weather, but is dangerous in NW weather. Several prominent buildings are on shore. Isthmus Cove and Avalon are connected by a road, and during the tourist season launch service is maintained between the two points. The Catalina Cove and Camp Agency at **Two Harbors** at the head of the cove is the issuing agency for landing permits and leasing of mooring buoys for Santa Catalina Island (except Avalon).

Storm warning signals are displayed. (See chart.)

A pier at the head of the cove extends out to a depth of about 12 feet; a fuel dock is on the E side of the pier. Water, ice, marine supplies, and limited repairs are available; a general store and restaurant are ashore.

Emergency rescue service is available at Two Harbors. The fire and rescue boat can be contacted through the Coast Guard and monitors 2182 kHz and VHF-FM channel 16 (156.80 MHz) from 0900 to 1700 daily; the call sign is "Baywatch."

Fourth of July Cove and **Cherry Cove,** just NW of Isthmus Cove, are popular day anchorages for yachts using the facilities at Two Harbors. There are a number of private moorings in both coves. The shore areas are leased.

A **restricted and nonrestricted anchorage area** is in Isthmus Cove. (See 110.1 and 110.216, chapter 2, for limits and regulations.)

The approach to Isthmus Cove alongshore from the E is clear, but W of the entrance is **Eagle Reef,** covered 3 feet. The reef is marked by growing kelp and by a buoy about 100 yards to the E. In the approach from the N, **Ship Rock,** about 1 mile N of the cove, is the guide. A light is shown from a pole on the rock. From the channel the rock resembles a black haystack; the top is mostly white because of bird droppings. A reef extends about 120 yards S of Ship Rock, ending in a rock that uncovers 3 feet.

Bird Rock, 37 feet high and about 150 yards long, is about 500 yards off the beach N from the E part of the cove entrance. The rock is covered with sand and grass. In places, reefs extend off the rock more than 100 yards, but it may be approached close-to on the E side.

Harbor Reefs, about 400 yards SW of Bird Rock, are about 450 yards long in a NW direction and about 250 yards wide. They usually are well marked by kelp. A rock near the E end uncovers about 2 feet. The reef is marked by buoys.

Fisherman Cove, in the E part of Isthmus Cove, is small, but is said to be the only shelter against Santa Ana winds on the N shore of Santa Catalina Island. The cove is an overnight anchorage for large and small pleasure boats, which frequently fill it during the summer.

Catalina Harbor, on the S side of the isthmus separating it from Isthmus Cove, affords excellent shelter for small vessels in all but S weather. **Catalina Harbor Light** (33°25.4'N., 118°30.8'W.), 400 feet above the water, is shown from a pole on **Catalina Head,** on the W side of the harbor entrance. The harbor, a popular yacht anchorage, is funnel-shaped, open to the S, and easy of access. Small and bare **Pin Rock,** close inside the E head of the harbor, is 150 yards offshore and has deep water around it. The anchorage is in 4 to 5 fathoms, soft bottom, abreast **Ballast Point,** the long low point on the E shore. The head of the harbor is shoal. The 3-fathom curve is marked by kelp, and vessels entering should give the shores a berth of 150 yards. The facilities on Ballast Point are leased by a yacht club. From the head of the harbor it is only about 0.3 mile overland to Two Harbors.

Chart 18740.–San Pedro Channel is about 17 miles wide between the mainland, Point Fermin to Point Vicente, and Santa Catalina Island. Current observations have been made 7 miles S of San Pedro Breakwater. Two periodic currents occur at this location: a tidal current, and a daily current apparently due to a land and sea breeze. Both are rotary, turning clockwise, and each is weak, having a velocity of 0.2 knot. The tidal current is very complicated, but the daily current is simple, maintaining on the average an approximately constant velocity and shifting direction to the right about 15° each hour. It sets N about 0900, E at 1500, S at 2100, and W at 0300.

Currents due to winds and oceanic drifts vary in velocity and direction. The average current for the period of observations sets 112° with a velocity of 0.1 knot. Currents greater than 1 knot occur infrequently. The greatest velocity during 5 months of observations was 1.5 knots.

Chart 18755.–San Nicolas Island, the outermost of the group off southern California, is 53 miles off the nearest point of the mainland, 43 miles WNW of San Clemente Island, and 24 miles SW of Santa Barbara Island. The island is a military reservation and off limits to the public.

A **naval restricted area** extends 3 miles from the shoreline around the island. (See 207.615, chapter 2, for limits and regulations.)

The island is 8 miles long in an E direction, 3 miles wide, and 907 feet high at its highest point; it is visible about 38 miles. The island has a gently rounding profile from a distance. The W part is covered with sand, some of which has drifted to the middle N shore. The rest of the island is cut by deep arroyos, and the top of the mesa is spotted with patches of burr clover and bunch grass. With the exception of the rocky points, the beaches are all sand. The island is practically surrounded by kelp. At the W end the kelp extends W about 3 miles over very irregular bottom. Two reefs in the kelp extend 1.6 miles W from the W extremity of the island. In thick weather great caution must be exercised in approaching from W and vessels should in no case pass inside the kelp. No dangers are known to exist outside the kelp.

An aerolight, 981 feet above the water, is near the center of San Nicolas Island, and an aero radiobeacon is near the E end. Marine lights are shown from white pyramidal structures on the S, E, and N sides of the island. A lighted buoy is 1.3 miles SE of the E sandspit.

Begg Rock, 15 feet high, is 8 miles NW of the W point of San Nicolas Island. A reef extends N and S of the rock over 100 yards in each direction. The rock rises abruptly from depths of 50 fathoms. A lighted whistle buoy is 500 yards N of the rock.

A bank covered 30 to 50 fathoms extends 7.8 miles E from the E point of San Nicolas. From the 50-fathom curve the depths increase rapidly to the E and S.

Restricted anchorage areas are off the NW, SW, and SE ends of San Nicolas Island. (See 110.220, chapter 2, for limits and regulations.) Upon approval by naval authorities, indifferent anchorage may be had on the S side of the 0.6-mile-long sandspit on the E end of the island. Small craft anchor in 8 fathoms, hard sand bottom, near the inshore edge of the kelp. Larger vessels anchor farther offshore in 10 to 17 fathoms, hard sand bottom. The anchorage is often uncomfortable because the island tends to split the W seas and they break with equal force on both sides and meet off the end of the spit in a maelstrom of breakers. This condition tends to move the sand from the W end of the island and builds up the sandspit. After sunset a strong wind frequently blows off the mesa, making holding difficult. In a blow, local fishermen usually leave this anchorage, preferring the one at Santa Barbara Island. A landing can usually be made at the E end on the S side of the island during the summer without difficulty.

Chart 18740.–Osborn Bank, about 22 miles ENE of San Nicolas Island and 6.5 miles S of Santa Barbara Island, is 5 miles long in a WNW-ESE direction and has an average width of 1 mile. The least depth found over it is 19 fathoms.

A submerged pinnacle rock of very small area covered by at least 17 fathoms is 16 miles NNW of Santa Barbara Island.

Channel Islands National Monument.–Santa Barbara Island, Anacapa Island, and areas within 1 mile of the shoreline of these islands, except for certain described parcels of land, have been reserved as Channel Islands National Monument, and are subject to rules and regulations prescribed by the Secretary of the Interior and administered by the National Park Service. Additional information may be obtained from Channel Islands National Monument, 1699 Anchors Way, Ventura, Calif. 93003.

Chart 18756.–Santa Barbara Island, 33 miles SSW of Point Dume and 21 miles W from the W end of Santa Catalina Island, is 1.5 miles long in a N direction and has a greatest width of 1 mile. It is uninhabited. The profile of the island is saddle-shaped, and at a considerable distance it appears to be two islands. The greatest elevation is 635 feet on the S side of the saddle, and the island is visible for over 25 miles in clear weather. The shores are bold and precipitous and well marked by kelp extending to about 10 fathoms at irregular distances from the shore. W of the island the kelp makes out more than a mile over very irregular bottom; a rock that breaks in moderate swells is 0.7 mile W of the point. This rock may not break in a calm sea and is dangerous, even for small craft. The water around the island is deep except where the kelp indicates foul or rocky bottom.

Santa Barbara Island Light (33°29.3'N., 119°01.8'W.), 195 feet above the water, is shown from a white pyramidal structure on the NE point of the island.

Sutil Island, a rocky islet 300 feet high and surrounded by kelp, is 0.4 mile W from the S point of Santa Barbara Island; its N face is steep. A smaller 145-foot-high rock islet is 200 yards offshore about 0.2 mile W from the N point of Santa Barbara Island.

A **general anchorage area** extends 2 miles off the E coast of Santa Barbara Island. (See 110.1 and 110.222, chapter 2, for limits and regulations.) For yachtsmen desiring to go ashore, an anchorage reported to give fair protection for small craft in the prevailing W weather is in the small cove about 700 yards W of Santa Barbara Island Light. (If the water is too deep or too rough to anchor off the cove, anchor inside, but maintain an anchor watch.) Swinging room on a single anchor is restricted in the cove. The cove affords no landing beach; yachtmen can debark from a dinghy onto rock steps in the side of the cliff. Large vessels can anchor within the 30-fathom curve with hard gray sand bottom.

Chart 18729.–Anacapa Island, 11 miles SW of Point Hueneme, is the easternmost of the northern group of Channel Islands and consists of three islands separated by two very narrow openings that cannot be used as passages. The E opening is filled with rocks and is bare. The W opening is only 50 feet wide and is blocked by sand. **Anacapa Island Light** (34°00.9'N., 119°21.5'W.), 277 feet above the water, is shown from a white cylindrical tower on the E end of the island. A radiobeacon and a fog signal are at the light.

From its E point the island extends 4.5 miles in a general W direction. The E and lowest island of the Anacapa group is 1 mile long, 0.2 mile wide, 250 feet high, and rather level on top. The middle one is 1.5 miles long, 0.2 mile wide, and 325 feet high. The W and largest island is 2 miles long and 0.6 mile wide, and rises to a 930-foot peak. The westernmost island is visible at a distance of 35 miles in clear weather; the other two at 15 to 20 miles. The shores of Anacapa Island are perpendicular and filled with numerous caves. The E extremity terminates in 80-foot **Arch Rock,** with a 49-foot arch and a pyramidal rock just S of its E end. The island is surrounded by kelp except in a few small places.

The National Park Service rangers are the only persons on Anacapa Island. Seals and pelicans are present in large numbers. The cream-colored houses with tile roofs of the park service rangers are

300 to 400 yards W of the light. A single large white building is 100 yards farther to the W.

The best anchorage in SE storms is on the N side about 0.2 mile N of the center of the middle island in depths of 9 to 12 fathoms. In NW weather the best anchorage is 0.3 mile S of the E opening in depths of 8 to 12 fathoms. However, it is best for larger vessels to lie at Smugglers Cove, on the E side of Santa Cruz Island, where the bottom is not so steep-to. Small boats anchor in 5 to 7 fathoms in **East Fish Camp,** a bight about 0.4 mile SW of the E opening. About the only protection from northeasters is to anchor as close as possible in the bight immediately W of **Cat Rock,** on the S side of the W island. The Coast Guard maintains a boat landing and hoist on the N side near the E extremity. Landings can also be made on either side of the island near the W opening and at East Fish Camp. In thick weather, vessels in the area should stay in 50 fathoms or more, because the island rises abruptly from deep water.

Anacapa Passage, between Anacapa and Santa Cruz Islands, is 4 miles wide and free of dangers. It is steep-to on the Anacapa Island side and has a gradual slope to the shore of Santa Cruz Island. The passage is seldom used, and should not be attempted in thick weather as soundings give no warning of a close approach to the islands. Tide rips are strong under certain conditions of wind and current, especially during SE storms and northeasters.

Charts 18729, 18728.–Santa Cruz Island, 17 miles WSW of Point Hueneme, is the largest of the Channel Islands. It is privately owned and permission must be obtained to land. Landing permits for the area extending E from Coche Point, on the N, thence around the E end of the island to Sandstone Point, may be obtained from Pier Gherini, 230 La Arcada Boulevard, Santa Barbara, Calif. 93104, or from Francis Gherini, 162 South "A" Street, Oxnard, Calif.; there is no landing fee. Landing permits for the rest of the island may be obtained from Santa Cruz Island Company, 515 South Flower Street, Los Angeles, Calif. 90071; a landing fee is required.

The island is about 21 miles long in a W direction and has an average width of 5 miles. The highest peak, in the W part of the island, rises to 2,434 feet; in the E part the land attains an elevation of about 1,800 feet. The E part is very irregular, barren, and destitute of water; the W part has a few trees, is well covered with grass, and has several springs. Sheep and cattle are raised. The shores are high, steep, and rugged, with deep water close inshore, and there is considerably less kelp than around the other islands. The reefs, extending a mile offshore on the S coast at Gull Island, are the only outlying dangers.

San Pedro Point is the E extremity of the island. There is a small-boat landing in **Scorpion Anchorage,** a shallow bight 1.8 miles NW of San Pedro Point; it consists of a cribbed area with a float and gangway at the end of the roadway. Several large buildings are along the roadway. Large clumps of trees are near the houses.

Chinese Harbor, in the E part of the broad bight on the N shore, 4.5 miles W of San Pedro Point, affords anchorage in the kelp in 5 to 6 fathoms. The NE part of the harbor is an excellent anchorage in SE to SW weather in 9 to 10 fathoms. This harbor affords the best shelter on the island from NE winds.

Prisoners Harbor, in the W part of the bight on the N shore 8 miles W of San Pedro Point, affords shelter from all winds except from NE to W. Some protection from NW weather is afforded by the kelp, but a heavy swell rolls in. In NE weather the anchorage is unprotected and dangerous. A wharf with 16 feet at its face is in the harbor. There are buildings back of the wharf. The best anchorage is in 12 to 15 fathoms, sandy bottom, abreast a white rock on the W shore of the bight, and the outer end of the wharf in range with the buildings at the inner end.

Pelican Bay, a small indentation in the N shore of Santa Cruz Island, 1 mile WNW of Prisoners Harbor, is used as a yacht anchorage during the summer. In NW weather small boats anchor close to the cliff that forms the W shore of the bay.

Painted Cave, 3 miles E of **West Point,** the NW extremity of the island, is a large cave into which dinghies may be rowed for a considerable distance. The entrance is over 150 feet high. The inner end of the first chamber, 600 feet from the entrance, has depths of more than 2 fathoms.

Forney Cove, 1 mile E of **Fraser Point** at the W end of the island, affords shelter in N weather in 7 to 8 fathoms. The surf is heavy on the beach, but the rocky islet W and the reef connecting it with the shore lessen the swell at the anchorage.

Gull Island, 65 feet high and about 0.2 mile in extent, is the largest and outermost of a group of small rocky islets, 0.7 mile S of **Punta Arena,** on the S side of Santa Cruz Island. Kelp surrounds Gull Island, and the bottom in the vicinity of the group is foul. A light is shown from a white pyramidal structure on the island.

Willows Anchorage, on the S shore 3.6 miles E of Gull Island, can be used by small craft in NW weather and affords a good boat landing.

Smugglers Cove, 1.2 miles SW of San Pedro Point, affords shelter in NW weather in 5 fathoms, sandy bottom.

Santa Cruz Channel, between Santa Cruz and Santa Rosa Islands, is 5 miles wide, with good water close to both islands. The rocks off the W and SW points of Santa Cruz Island and the E and NE points of Santa Rosa Island are so close inshore that they cannot be considered as dangers in the channel.

Charts 18728, 18727.–Santa Rosa Island, 24.5 miles SW of Goleta Point on the mainland, is 15 miles long in a W direction and has a greatest width of nearly 10 miles. The island is privately owned, and permission must be obtained to land. Landing permits may be obtained from A. Vail, 123 West Padre Street, Santa Barbara, Calif. 93105; there is no landing fee.

The highest point, near the middle of the island, is 1,589 feet high and visible over 40 miles. The island has some water and is partially covered with vegetation, but there are no large trees. The shores are bold, high, and rocky; kelp surrounds most of the island. Depths in the approaches to the island shoal more abruptly from S than from N, where the 100-fathom curve is over 5 miles and the 20-fathom curve about 2 miles from the beach.

There are no harbors, but anchorage may be made in Bechers Bay and Johnsons Lee. There are several good boat landings.

East Point, the E extremity of Santa Rosa Island, is moderately high, sharp, and bold. A rock covered 2¾ fathoms is in the kelp 0.7 mile N from the point, and a shoal covered 3¼ fathoms is 2 miles N of the point.

Numerous rocks and pinnacles covered 5¾ fathoms are in an area centered 1.5 miles S of the point and extend 0.8 mile NW and SE.

Skunk Point, 2.5 miles N of East Point, is formed of drifts of sand; it is difficult to see on dark nights. There are sand beaches W and S, and the sand dunes behind the point are as much as 300 feet high. Care should be taken to avoid the sandspit off the point where the sea breaks heavily in bad weather. The current is sometimes strong in the vicinity of the point.

Bechers Bay, a broad semicircular bight on the NE side of Santa Rosa Island, is 4.5 miles wide between Skunk and Carrington Points and 1.5 miles in depth. **Southeast Anchorage,** 1.3 miles W of Skunk Point, affords protection in SE weather in about 6 fathoms, sandy bottom. **Northwest Anchorage,** in the W part of the bight and 1.5 miles S from Carrington Point, affords fair shelter in NW weather. A pier at the anchorage has 16 feet at its outer end. Cattle from the ranch on the island are loaded on barges here; a mooring buoy is off the pier. The best anchorage is in 6 to 7 fathoms off the end of the pier.

Carrington Point, the N point of the island, has a seaward face 0.8 mile in length. It is bold and rocky, and rises rapidly to an elevation of 452 feet.

Foul ground extends about 0.3 mile N from Carrington Point and terminates in **Beacon Reef,** which covers 2¼ fathoms. The reef rarely breaks, and there is no safe passage behind it.

Brockway Point, high, bold, and rounding, is about midway along the N shore of Santa Rosa Island. **Rodes Reef,** marked by kelp, is a patch of three submerged rocks 1.6 miles ENE from Brockway Point and 0.8 mile offshore. It breaks in nearly all weather.

Sandy Point, the W extremity of the island, is moderately bold and rocky, with a detached rock lying close inshore and sand dunes more than 400 feet high extending inland. These white dunes are prominent when approaching from S or W. Shallow water extends off the point. During the general NW weather, swells form at a considerable distance from the shore. The swell also reaches the point from a SW direction.

An anchorage on the S side of Sandy Point affords shelter from N and NW winds to small vessels, but local knowledge is necessary to avoid outlying rocks.

Talcott Shoal, covered 1¾ fathoms, is on the edge of the kelp 1.5 miles NNE from Sandy Point. Depths surrounding the shoal range from 4 to 12 fathoms. The shoal breaks only in heavy weather. In calm weather there is little indication of the shoal as the kelp is light and there is very little lumping of the water. A detached kelp patch is 1 mile N of the shoal.

Bee Rock, 0.8 mile offshore 3.6 miles SSE of Sandy Point, is 5 feet high, but is not easily seen. It is surrounded by kelp that stretches from South Point to Sandy Point. A smaller rock, 10 feet high, is about 100 yards SE of the rock. In ordinary weather there is a lumping of the water with an occasional break on the rock, covered 2 fathoms, 0.3 mile NW of Bee Rock. Another rock, covered 1¼ fathoms, is close S of Bee Rock. Several other rocks and shoals exist inside the kelp. Vessels should not go inside the kelp in this area.

South Point, the S point of Santa Rosa Island, terminates in a rocky bluff 100 feet high, and rises rapidly to a height of 460 feet, then to 603 feet. Cliffs, several hundred feet high and about 0.5 mile in extent, form the SW face of the point. A light is shown from a small white house on the point.

Johnsons Lee, an open roadstead immediately E of South Point, affords fair shelter from W and NW winds, but is dangerous in S weather. The Coast Guard makes landings on the W shore of Johnsons Lee with supplies for South Point Light.

San Miguel Passage, between Santa Rosa and San Miguel Islands, is 2.5 miles wide between the ledges which project from Sandy Point and Cardwell Point, the closest points between the two islands. There is much broken water with many current rips near these ledges. To avoid Talcott Shoal, vessels making the passage from the SW should not allow the outer rock off the W point of Santa Rosa Island to bear W of S until clear of the shoal. Sailing vessels should avoid this passage as the light airs and calms under the lee of San Miguel Island and the currents frequently combine to set a vessel toward Talcott Shoal.

A **naval danger zone** is around San Miguel Island and extends into San Miguel Passage. (See 204.203, chapter 2, for limits and regulations.)

Chart 18727.–San Miguel Island, 23 miles SSE of Point Conception, is the westernmost of the Channel Islands and the most dangerous to approach. The island is irregular in shape and 7.6 miles long in a E-W direction, with an average width of 2 miles; the highest points, 831 and 822 feet, are near the middle of the island and are visible about 35 miles. The island is covered with grass, but there are no trees. The W part has more sand dunes on it than any of the other islands in the group. The shores are bold, broken, and rocky, with a few short stretches of beach; the S shore is more precipitous than the N. Several anchorages and boat landings are available along the N and S shores.

Prior approval of the Commander Pacific Missile Range, Point Mugu, Calif., is required to enter San Miguel Island.

A **naval danger zone** has been established around San Miguel Island. (See 204.203, chapter 2, for limits and regulations.)

Cardwell Point, the E extremity of the island, terminates in a low sandy point extending 0.5 mile E of a cliff 40 feet high. A dangerous reef extends 0.4 mile E of the point, and foul ground extends 0.8 mile NNW. In 1972, a shoal was reported encroaching into San Miguel Passage from Cardwell Point with breakers reported extending to a point in about 34°01.1'N., 120°17.4'W. A submerged rock and a rock awash are about 400 yards S of the middle of the sandy point. During prevailing weather, breakers off this point are caused by the meeting of the seas.

Prince Island, 296 feet high, is 2.6 miles NW of Cardwell Point and 0.4 mile off the E head of Cuyler Harbor. The island is dark in color and rocky, with a precipitous seaward face.

Cuyler Harbor is a bight 1.2 miles long and 0.6 mile wide on the N shore SW of Prince Island. The anchorage is in the W part of the harbor; the E part is foul. Good shelter may be had in S weather, but the holding ground is poor. In strong NW weather the heavy swells that sweep around the N shore and into the harbor make the anchorage dangerous. The harbor is not safe in rare N or E winds. Water may be obtained at a small spring abreast the anchorage. Prince Island and Harris Point are prominent in the approaches.

Middle Rock, 0.5 mile WSW of Prince Island, uncovers about 4 feet; foul ground surrounds the rock for a distance of 100 yards. **Can Rock,** 4 feet high, is 0.3 mile SW of Prince Island; there is foul ground between the rock and the S shore of the harbor. Kelp grows all over the bight.

To enter Cuyler Harbor, bring Harris Point to bear 261°, distant 1.7 miles, and the W point of Prince Island to bear 186°, distant 1.3 miles; thence steer **209°**, heading midway between Middle Rock and the W point at the entrance, and when the S point of Prince Island bears 084°, anchor in 5 to 7 fathoms. The course heads for **Judge Rock,** small and black, near the W end of the sand beach. The W point at the entrance off **Bat Rock** should be given a berth of about 0.3 mile to avoid the shoal extending E for over 300 yards. If desired, anchorage may be made about 0.1 mile farther W, where better protection is afforded in NW weather. The passage between Prince Island and the E head should be attempted only by small craft.

Harris Point, the N extremity of the island, is bold and precipitous, rising to a hill, 485 feet high, 1 mile S of the point. There are no outlying dangers, and the water is deep close-to.

Wilson Rock, 2.2 miles NW of Harris Point, is 19 feet high and black. A reef, extending about 1 mile WNW from the rock, uncovers in two places; foul ground is a short distance N of the reef. It breaks in any light swell from the NW. There is foul ground S and SW of the rock. The covered rock 0.3 mile S of Wilson Rock breaks. This locality should not be approached in thick weather, as the dangers rise abruptly from deep water and are not marked by kelp; soundings give no positive warning of their proximity.

Simonton Cove, on the NW side of San Miguel Island, is a very shallow bight 2.4 miles long and 0.6 mile wide. This cove has considerable kelp and a few covered rocks. There are several freshwater springs in the bluffs just above high water. From the SW head of Simonton Cove, foul ground extends NW for nearly 1 mile.

Castle Rock, 180 feet high, is a three-headed islet 1.6 miles NNE from Point Bennett, in the middle of the kelp field, and 0.5 mile offshore. A shoal spot 0.5 mile W of the rock is near the edge of the kelp.

Westcott Shoal, covered 4¾ fathoms, is 0.8 mile N from Castle Rock. A 2¾ fathom spot near an oil spring is about 0.6 mile N from the shoal.

Point Bennett, the W point of the island, is a long, narrow, jagged bluff, 74 feet high, rising rapidly to 337 feet. High sand dunes extend from the point for 2 miles. There are two rocky islets S of and close under the point, and foul ground extends about 0.5 mile W and 1 mile N of the point but inside the limit of the kelp. A lighted whistle buoy is about 0.8 mile SW of the point.

Caution.–Navigation in this area should not be attempted without local information.

Richardson Rock, 5.5 miles NW from Point Bennett, is 53 feet high, white-topped, and small in area. Two smaller and lower rocks are close-to on the E side. Richardson Rock rises abruptly from deep water, 30 to 40 fathoms being found within 0.3 mile. The rock is prominent in clear weather, but in thick weather the locality should be avoided, as soundings give no warning of a near approach. A lighted whistle buoy is about 0.5 mile NW of the rock.

Anchorage for small craft may be had at **Adams Cove,** immediately E of Point Bennett, and at several places along the S shore of San Miguel Island, but local knowledge is necessary.

Tyler Bight, on the S shore 1.8 miles E of Point Bennett, affords shelter for small craft in NW weather. Anchor in 7 fathoms, sand bottom, at the NW part of the bight under the high bluff, with **Judith Rock,** at the W entrance of the bight, bearing 265°, 500 yards distant; kelp extends S and E of the point. In moderate NW weather, the winds may attain velocities up to 45 knots 0.5 mile offshore; the sea in the bight, however, is quite smooth.

Wyckoff Ledge, 1.4 miles W from Crook Point and 0.5 mile offshore, is covered 1½ fathoms.

Crook Point, the S point of the island, is low and irregular. A boat landing may be made on the S shore of the island in a small cove immediately W of the point, but there is no anchorage.

Chart 18720.–Santa Barbara Channel is 63 miles long and increases gradually in width from 11 miles at the E end to 23 miles at the W end. The channel is free of dangers and has depths of 40 to more than 300 fathoms along the recommended track from San Diego and Los Angeles to northern ports.

Offshore oil wells and oil drilling platforms, some privately marked by lights, buoys, and fog signals, extend as much as 10 miles offshore between Point Hueneme and Santa Barbara Point.

On the N side of Santa Barbara Channel is the mainland between Point Hueneme and Point Conception. On the S side is the northern group of the Channel Islands–Anacapa, Santa Cruz, Santa Rosa, and San Miguel–which break the force of the heavy westerly Pacific swell and afford a lee in winter from the full force of the SE gales.

The E entrance to Santa Barbara Channel has a clear width of 2 miles between the 100-fathom curves, and lies between Anacapa Island and Point Hueneme. On the N side of this entrance is deep **Hueneme Canyon,** which extends from Point Hueneme in a SSW direction across the channel. The W entrance to the channel has a clear width of 10 miles between the 100-fathom curves, and lies between Richardson Rock and Point Conception. (See chapter 4 for details about the **Traffic Separation Scheme** between Point Fermin and Point Conception.)

Weather.–The prevailing winds are W and blow nearly every day, especially in the afternoon. SE storms occur in the winter, and at times the sea is too rough for several days to permit the passage of small vessels.

In the summer the winds in the channel are wholly different from those outside the islands and off the coast to the NW. Under the N shore, which is protected by the bold range of the Santa Ynez Mountains, the W winds do not reach far E of Point Conception with much strength but are felt towards the islands, a strong NW wind and heavy swell coming in from the open ocean. The climate in the Santa Barbara Channel, because of this blocking of the winds, is much milder than to the N along the coast. However, during NW weather boats crossing the channel from the mainland usually encounter heavier seas as the islands are approached. The belt of rough seas, locally known as **Windy Lane,** lies along the N shores of the islands and is about 6 miles wide. This sea condition is the opposite to that experienced in the crossing from Los Angeles-Long Beach to Santa Catalina Island. Strangers are cautioned that good seamanship sometimes calls for returning to the mainland rather than attempting Windy Lane when rough seas are encountered. These W winds usually begin about 1000 and grow progressively stronger until sundown.

During heavy NW weather strong squally winds draw down the canyons between Point Conception and Capitan and pass directly offshore, causing a severe choppy sea. Heavy NW gales are often encountered off Point Conception on coming through Santa Barbara Channel, and great changes of climatic and meteorological conditions are experienced; the transition is often remarkably sudden and well defined.

In the fall and winter, stiff northeasters are occasionally experienced at and near the E end of the channel. They come up without warning, usually at night in clear dry weather, and when the barometer is either high or rising rapidly. At such times small boats should be prepared to seek shelter at a moment's notice.

During the summer heavy fogs are a common occurrence in the Santa Barbara Channel and envelop the main shore, channel, and islands. Sometimes the mainland and channel are clear while the islands alone are hidden. At other times all are clear during the day, but wrapped in dense wet fog at night. This condition, the fog lying offshore during the day and enveloping the land at night, is characteristic of the whole southern California coast. The fogs occur mostly during calm weather and light winds, and are generally dissipated by the strong NW winds.

Currents in Santa Barbara Channel are variable, depending to a great extent upon the wind. It appears that a weak nontidal flow sets E in the spring and summer, and W in autumn and winter.

It has been observed that a strong inshore set prevails on a rising tide in the deep waters of Hueneme Canyon. In general, there are conflicting currents, at times quite strong, around the slopes of the submarine valleys both here and off Point Mugu.

The tidal current sets along the N shore of Santa Barbara Channel with velocities of 0.5 to 1 knot. In heavy NW weather, the current and heavy swells make into the S side of the W entrance to the channel and along the N shore of San Miguel Island.

The currents in the vicinity of the Channel Islands frequently follow the direction of the wind, with eddies under the lee of the islands and projecting points. Tidal currents of about 1 knot set through the passages between the islands.

6. POINT ARGUELLO TO SAN FRANCISCO BAY, CALIFORNIA

This chapter describes the waters of San Luis Obispo, Estero, Morro, Monterey, and Half Moon Bays; also, the port of Port San Luis, and the small-craft and commercial fishing harbors of Morro Bay, Monterey, Moss Landing, Santa Cruz, and Pillar Point. The coast, except for the bays, is rugged with many detached rocks close inshore and other dangers extending no more than 2 miles offshore. However, in 1975, shoaling to 10 fathoms was reported in 37°00.0'N., 122°30.1'W., about 12 miles SW of Pigeon Point. The area is well marked with navigational aids, and loran coverage is considered good.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1205 through 80.1230, chapter 2.

Weather.–The weather along this coast is mostly cool, damp, and foggy in the summer, becoming mild and wet in winter. Summer afternoons on the coast are often clear and pleasant. The dominant weather feature is the semipermanent Pacific high. In summer, it is big and strong and covers the entire region. Storms and fronts are forced to move along the N side, so few affect this coast. In winter, the high weakens and retreats SE. This allows storms or frontal systems to pass through the area about every 7 to 10 days, on the average. Sometimes a series of these systems may result in a prolonged period of strong winds and heavy rains along the central and southern California coast. This situation is rare and occurs about every 2 to 3 years.

The clockwise flow around the highs results in a NW flow along the coast in summer. These winds are enhanced by the formation of a thermal low over land, to the SE. This low results in a sea breeze that can reach 20 knots during the afternoon and persist, at lower speeds, until midnight. Daytime temperatures often climb to near 70°F.; nighttime lows drop to the low fifties in summer. Occasionally a hot flow from the land will push temperatures into the nineties. This is as likely in early fall as it is in summer. The winds blowing across the cool California Current produce low clouds and sea fog. These conditions are prevalent close to the coast in the early morning hours. They improve during the day, particularly close to and on the shore. August and September are the worst months; fog reduces visibilities to below 0.5 mile on more than 15 days per month at some locations.

Winds are more variable, but often NW, in winter, becoming WNW in midwinter. Weak E winds often occur when a warm-type high centers itself over the Great Basin to the NE. It produces clear skies and ideal conditions for land fog, which may drift out over coastal waters. This fog, while often dense, is shallow and usually burns off during the morning hours. Occasionally following a passage of a cold front, a cold-type high will move into the Great Basin. This can result in a foehn wind, over central and southern California, known as a Santa Ana. This NE wind flows down the canyons and into certain coastal basins. Its effect varies from place to place, but speeds may reach 50 knots. In some areas, an intensified sea breeze counterflow is observed. The most severe conditions are normally observed in late fall, but may occur from fall through spring, which is also considered the rainy season. From about November through April, precipitation occurs on about 6 to 12 days per month. Average maximum temperatures in winter range from the middle fifties around San Francisco, to the low sixties at Point Arguello, while nighttime lows drop to the low to middle forties. Occasionally a cold outbreak will send temperatures below freezing.

Charts 18700, 18721.–From Point Arguello to Point Sal, the coast trends N for 19.5 miles in two shallow bights separated by Purisima Point. From Point Sal the coast continues N for 14 miles, then bends sharply W for 6 miles to Point San Luis, forming San Luis Obispo Bay. Soundings are useful along this stretch of the coast, and between Point Arguello and Point San Luis the 20-fathom curve can be followed with safety in thick weather. In clear weather, the headlands and other natural features can be easily recognized.

Danger and restricted areas extend 3.5 miles offshore from S of Point Arguello to Point Sal. (See 204.202, chapter 2, for limits and regulations.)

Point Pedernales, 1.5 miles N of Point Arguello, and the largest of the numerous rocks as far as 300 yards offshore, are very dark and conspicuous alongside the sand dunes immediately N of the point.

La Honda Canyon, 2 miles N of Point Arguello, is a deep gulch crossed by a railroad trestle easily distinguished when abreast the mouth. From here the coast to Purisima Point consists of a low tableland and sand dunes that contrast strongly with the dark cliffs S.

Surf, 7 miles N of Point Arguello, is a station along the railroad. The yellow station house and a black tank are conspicuous. A red and white elevated water tank, 1.3 miles NE of the station house, and several launching gantries at the Vandenberg Air Force Base are conspicuous along this section of the coast.

Chart 18700.–Purisima Point, 10.6 miles N of Point Arguello, is low and rocky, with reefs extending SE for 0.3 mile. The N side of the point is bare sand. It has been reported that an inshore set is experienced off the coast in the vicinity of the point. From Purisima Point to Point Sal, the coast is sandy and lower than that S.

Point Sal, 19.5 miles N of Point Arguello, is a bold dark headland marked by stretches of yellow sandstone. From the NW the headland looks like a low conical hill with two higher conical hills immediately behind it. It rises gradually to a ridge, 1,640 feet high, 3 miles to the E. From the S the hills are not so well defined. **Lion Rock,** 54 feet high, is a rocky islet 200 yards off the S face of Point Sal. A small rock is close to the point. Breakers and reefs extend nearly 600 yards S and W from Point Sal and 200 yards SW of Lion Rock.

Anchorage under Point Sal affords some protection from NW winds in 7 to 9 fathoms, sandy bottom, but is subject to swells. Shoal water extends nearly 0.5 mile W from the SE point of the anchorage. The best anchorage is in 7 fathoms 500 yards 123° from Lion Rock and with the northern end of the rock just open of the extremity of Point Sal.

From Point Sal north the coast is a sand beach backed by low dunes for 14 miles and then changes to bold rocky cliffs that curve sharply W to Point San Luis and form the N shore of San Luis Obispo Bay.

Oceano is a small resort 12 miles N of Point Sal. The county airport is here.

Pismo Beach is a resort 14 miles N of Point Sal. The pleasure pier is 1,200 feet long and has 12 feet at the outer end. There are no facilities for landing at the wharf. The place is noted for its clams. **Shell Beach** is a small residential settlement, 1.5 miles NW of Pismo Beach. An aerolight, 6 miles N of Pismo Beach, is visible from seaward.

Charts 18703, 18704.–San Luis Obispo Bay, 35 miles N of Point Arguello, is a broad bight that affords good shelter in N or W weather. S gales occur several times during the winter. The E shore is a narrow tableland that ends in cliffs 40 to 100 feet high to within 0.5 mile of **San Luis Obispo Creek** where a sand beach fronts **Avila Beach.** W of the creek the shore is high with rocky bluffs extending to **Point San Luis.**

Port San Luis, on the W shore of the bay, is the seaport for San Luis Obispo which is 10 miles inland. The port is primarily an oil-loading terminal, but is also used as a base for commercial fishing boats, sport-fishing boats, and recreational craft.

Prominent features.–Point San Luis is a bold prominent headland and reported to be a useful radar target.

San Luis Obispo Light (35°09.6'N., 120°45.6'W.), 116 feet above the water, is shown from a pole on Point San Luis. A fog signal is at the light, and a radiobeacon is about 275 yards N of the light. **San Luis Hill,** 0.5 mile NW of the light, is prominent from the S.

COLREGS Demarcation Lines.–The lines established for San Luis Obispo Bay are described in 80.1205, chapter 2.

Depths of 21 to 31 feet are available to the anchorage and wharves in San Luis Obispo Bay, but there are several 17-and 18-foot shoal spots that must be avoided.

Anchorage.–Large vessels can anchor between the two long piers in the W part of the bay according to draft. This anchorage is exposed in S or SE weather.

A good anchorage for small vessels is about 0.2 mile S of Port San Luis Wharf in 15 to 24 feet, muddy bottom.

Special anchorages are E of County Wharf and in the W end of the harbor. (See 110.1 and 110.120, chapter 2, for limits and regulations.) All anchorages are exposed to weather from the S and SE which cause heavy swells.

The dangers off the entrance to San Luis Obispo Bay are buoyed; the E part of the bay has many rocks and heavy growths of kelp. **Souza Rock,** 2.1 miles SE of San Luis Obispo Light, is covered 16 feet and rises abruptly from 19 fathoms. **Westdahl Rock,** 1.3 miles SW of the light, is covered 18 feet and rises abruptly from 10 fathoms. **Howell Rock,** 1.6 miles E of the light, is covered 13 feet. **Lansing Rock** covered 18 feet and **Atlas Rock** covered 13 feet are 0.7 and 0.5 mile E of the light, respectively.

A 2,400-foot breakwater, extending SE from Point San Luis through **Whaler Island** to a ledge partly bare at low water, provides some protection to vessels at anchor or at the wharves. **Smith Island,** 44 feet high and about 90 yards wide, is 0.2 mile N of Whaler Island.

Routes.–San Luis Obispo Bay may be entered from S by passing 100 yards W of the lighted gong buoy marking Souza Rock, thence a 000° course for about 2 miles until past Lansing Rock, and thence to anchorage or to the wharves. From N stay outside the lighted bell buoy marking Westdahl Rock and the lighted whistle buoy off Point San Luis breakwater, then head into the bay as previously mentioned.

Tides.–The mean range of tide at Avila Beach is 3.6 feet, and the diurnal range of tide is 5.3 feet. A range of about 9 feet may occur on days of maximum tides. The lowest low water is about 2.5 feet below mean lower low water.

Storm warning signals are displayed. (See chart.)

Port San Luis is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with the regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Harbor regulations.–The port of Port San Luis is administered by the Port San Luis Harbor District and under the control of a manager (harbormaster). His office is just behind the Port San Luis Wharf. Transients should report to the manager for guest mooring assignments. Two small-craft guest moorings are maintained.

Wharves.–Port San Luis Wharf, 0.7 mile N of Point San Luis, is used by commercial and sport fishermen. The berthing space at the end has 17 to 20 feet alongside. The wharf is lighted at night. A fuel dock is at the bulkhead just N of the wharf. The wharf is operated by the Port San Luis Harbor District.

Union Oil Co. Pier, 1 mile NE of Point San Luis, is an oil-loading terminal. The pier has 31 feet along both sides; however, a rocky patch covered 17 feet is 200 yards inshore from the W outer end of the pier. A private light and fog signal are operated on the outer end of the pier when ships are expected, and the pier is lighted its entire length when ships are being loaded. It is not safe to moor alongside in strong N weather; vessels usually leave the pier on the approach of a storm and anchor until it moderates. Mooring buoys are used to keep vessels clear of the pier. A tug is available for handling lines to the buoys. The pier is operated by Union Oil Co. of Calif.

County Wharf, 1.4 miles NE of Point San Luis, is used by fishing and pleasure craft. It has 25 feet alongside at the outer end and is lighted all night. A submarine sewer line runs the length of the wharf about 40 yards to the E. The wharf is operated by the County of San Luis Obispo, Department of Parks and Beaches.

Supplies and repairs.–Gasoline, diesel fuel, water, marine supplies, a launching ramp, and a 3-ton hoist are available.

Communications.–Transportation is by automobile to San Luis Obispo where rail, bus, and air connections can be made.

Charts 18703, 18700.–From Point San Luis to Point Buchon, the coast trends NW for 9 miles and consists of cliffs 40 to 60 feet high. The land rises rapidly from the cliffs to Mount Buchon. There are numerous outlying rocks and submerged ledges that extend more than a mile from the shore in some places.

Point San Luis and Point Buchon, both bold prominent headlands, are reported to be useful radar targets when navigating this section of the coast.

Mount Buchon, a rugged mountain mass between San Luis Obispo Bay, Estero Bay, and the valley of San Luis Obispo, is prominent from either N or S. **Saddle Peak,** 4.1 miles NNW of San Luis Obispo Light, is visible for over 40 miles.

Santa Rosa Reef, 1.4 miles WSW from San Luis Obispo Light, is covered 2¾ fathoms and rises abruptly from 13 fathoms. **Lone Black Rock,** 2 feet high and of small extent, is 0.5 mile W from the light and 0.2 mile offshore.

Pecho Rock, 40 feet high, is 3 miles WNW from the light and 0.5 mile offshore. A smaller rock, 2 feet high, is 0.3 mile E from it. Foul ground, marked by kelp, is between the rocks and the shore.

Diablo Canyon, 5.8 miles NW of Point San Luis Light, is the site of a large nuclear powerplant. The two concrete dome-shaped structures and other large buildings are conspicuous from well offshore.

A sharp prominent dark gray rock, [illegible] feet high, is 0.1 mile offshore from the powerplant.

Lion Rock, 0.9 mile NW from the powerplant and 0.2 mile offshore, is 240 yards long in a NW direction and 136 feet high. A high rock lies between it and the shore, and a small low rock is 200 yards W.

Point Buchon ends in an overhanging cliff 40 feet high, with a low tableland behind that rises rapidly to a bare hill a mile to the E. There are a few detached rocks close under the cliffs. A lighted whistle buoy is 1 mile SW of the point and about 400 yards WSW of a rock covered 3¾ fathoms.

Estero Bay is formed by a curve in the coast between Point Buchon and **Point Estero,** 13.5 miles NNW. The shore of the bay follows a general N direction from Point Buchon for 11 miles, then turns sharply W for 5 miles to Point Estero. The N part of Estero Bay is fringed with covered rocks and scattered kelp. The seaward faces of Cayucos Point and Point Estero are cliffs 50 to 90 feet high.

The coast drops abruptly from bold Mount Buchon to a sandy spit bordering Morro Bay and then rises to a bluff-bordered treeless country of rolling hills.

Point Estero, Morro Rock, and Cayucos Point are reported to be useful radar targets in the vicinity of Estero and Morro Bays.

Morro Bay, 6 miles N of Point Buchon, is a shallow lagoon separated from Estero Bay by a narrow strip of sand beach. The port facilities at the city of **Morro Bay,** a mile inside the entrance, are used by commercial fishing, sport-fishing, and recreational craft.

Morro Rock, the tall cone-shaped mound on the N side of the entrance to Morro Bay, is the dominant landmark in this area. A breakwater, extending 600 yards S from the rock, is marked at its outer end by **Morro Bay West Breakwater Light** (35°21.8'N., 120°52.1'W.), 36 feet above the water and shown from a white column. A fog signal and radiobeacon are at the light. The radiobeacon is unreliable in the area E of bearing 306° from the radiobeacon to the shore. A **rough bar warning light** is also at the breakwater light. This flashing white light, controlled by the harbormaster, is activated when hazardous conditions exist on the bar at the entrance to the bay. The light is visible from in the harbor and at sea, and will be shown in addition to the primary light on the W breakwater. Portions of the S tip of the breakwater are reported to be frequently awash under heavy seas and high tides, but have never been observed completely submerged.

The three 450-foot powerplant stacks 0.5 mile E of Morro Rock are visible from far offshore. The standpipe about 500 yards E of the stacks is prominent from close in. **Hollister Peak,** 4.2 miles ESE of Morro Rock, is the most prominent of a row of peaks behind Morro Bay because of its jagged outline.

COLREGS Demarcation Lines.–The lines established for Estero-Morro Bay are described in 80.1210, chapter 2.

Channels.–The entrance to Morro Bay is through a buoyed channel between the protective breakwaters.

Depths of about 9 feet can be carried in the channel from the entrance to **Fairbank Point,** about 1.8 miles above the entrance. The E side of the channel usually shoals; mariners are advised to favor the W side and to contact the harbormaster or the Coast Guard for depths, currents, and other channel conditions. In January 1982, shoaling to bare was reported to extend about 20 feet into the E side of the channel between Lighted Buoy 4 and Lighted Buoy 6; in 1977-July 1979, shoaling to an unknown extent was reported on the SW edge of the channel between Buoy 8A and Buoy 10. From Fairbank Point, a privately maintained channel continues S with reported depths of about 12 feet for 0.3 mile to the Morro Bay State Park Basin at **White Point.** The basin has depths of 8 feet. In 1973, it was reported that vessels heading for the basin should approach White Point close inshore as the channel narrows at this point. In February 1978, it was reported that shoaling was closing the entrance to the basin.

Swells from W or SW break across the entire entrance at low water.

Special anchorages are in Morro Bay, 1 and 2 miles above the entrance. (See 110.1 and 110.125, chapter 2, for limits and regulations.)

Tides.–The mean range of tide at Morro Beach is 3.5 feet, and the diurnal range of tide is 5.2 feet.

Currents in the entrance channel and around the breakwaters are strong at times. It is advisable to approach the entrance from the SW because of the currents and sea conditions. Sharp turns should be avoided in the vicinity of the breakwaters, especially in heavy weather.

Weather.–Estero Bay is one of the foggiest areas along the Pacific Coast. The fog is most common in the mornings and evenings. (See Weather, chapter 3, for further information.)

Storm warning signals are displayed. (See chart.)

Coast Guard.–A Coast Guard cutter, stationed at the city T-pier, monitors 2182 kHz and VHF-FM channel 16 (156.80 MHz).

Harbor regulations.–Morro Bay Harbor is owned by the city of Morro Bay and is under the control of a harbormaster who maintains an office at the foot of the city T-pier. The harbormaster monitors VHF-FM channel 16 (156.80 MHz). A harbor police boat operates from the city pier and monitors VHF-FM channel 16 (156.80 MHz) and 2182 kHz. The boat is manned during daylight, and a patrolman is on call at all other times.

Yachts and small craft may tie up to the city pier; otherwise they must either anchor in the bay or go to the small-boat basin at White Point which is administered by Morro Bay State Park.

Wharves.–The city T-pier, at the city of Morro Bay, is on the N side of the harbor about 0.8 mile above the entrance; depths alongside are about 22 feet. The pier is owned and operated by the city of Morro Bay.

The T-pier SE of the city T-pier is owned by the city and operated by Brebes Sea Food. It has about 20 feet alongside.

Supplies and repairs.–Gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available in the port.

A boat works has an elevator lift that can handle craft up to 50 tons and 65 feet long; hull and engine repairs can be made.

For 3 miles N of Morro Rock, submerged pipelines extend to oil loading terminals up to 0.8 mile offshore in Estero Bay; the outer limits are marked by buoys. Loading ships lie head-to in the direction of the prevailing NW wind. Adequate lines for offshore breast moorings are absolutely essential to prevent damage to the vessel and terminal equipment in case of a S wind. A mooring master supervises the mooring of vessels. An oil pier with a private light on its seaward end is 2.5 miles N of Morro Rock.

A rock covered 5¼ fathoms, 1.3 miles NW of Morro Rock, is marked by a gong buoy.

Cayucos, 4.5 miles N of Morro Rock and in the NE part of Estero Bay, has a wharf used by small fishing boats; a depth of 12 feet is at the outer end.

Anchorage with fair shelter from the N and NW may be had in 11 fathoms, sandy bottom, with the prominent white concrete tank on a hill W of Cayucos bearing 017°.

Mouse Rock, 0.7 mile W of Cayucos, is covered ¼ fathom and breaks heavily in all but smooth weather; it is marked by a bell buoy.

Cayucos Point, 2 miles W of Cayucos, is a low rocky promontory. **Constantine Rock,** 0.5 mile S of the point, is covered 1¼ fathoms and breaks heavily in a moderate swell; it is marked on the S side by a buoy.

Chart 18700.–From Point Estero N for 8 miles to the village of Cambria, the bluffs increase in height and the range of grassy hills is close to shore. Two radar domes are prominent 5 miles NW of Point Estero. The shore is well fringed with kelp; several rocks are close inshore. **White Rock,** 6 miles NW of Point Estero, is the most prominent. A pinnacle rock, 0.7 mile SW of White Rock, is covered 5¼ fathoms.

Von Helm Rock, 7.2 miles NW of Point Estero and nearly a mile offshore, is covered 2¼ fathoms. The rock is very sharp and breaks only in the roughest weather; it is marked by a lighted gong buoy.

Cambria is about 1 mile inland in a grove of pine trees. Some of the streets and buildings are visible from seaward. No landing or anchorage is recommended.

From Cambria for 6.5 miles to San Simeon, rocks continue close inshore, but the bluffs decrease in height and the hills recede from the shoreline. Thick groves of pine trees scatter the hillsides. Of the several rocks offshore, **Cambria Rock,** 10 feet high, and **Pico Rock,** 12 feet high, are the largest, but they are not prominent from seaward. Shoal patches up to 360 yards surround Cambria Rock, and there is foul ground NW and S of Pico Rock. A shoal, 580 yards SW of Pico Rock, is covered 3¾ fathoms.

San Simeon Bay, 14 miles NW of Point Estero, is formed by the shoreline curving sharply to the W, and on the W side by **San Simeon Point,** a low wooded projection extending SE. The trees show well from W, but from S the warehouses and buildings in San Simeon are more prominent. From W the point itself is not easily recognized by those not familiar with it.

A lighted bell buoy, 0.4 mile SE of the point, marks the entrance to San Simeon Bay. The bay offers good shelter in N weather, but is exposed to S gales in winter. The best anchorage is in the middle of the bight in 5 to 8 fathoms, hard sand bottom. A small ravine due W of the anchorage can be used to go ashore.

San Simeon, 1.7 miles ESE of San Simeon Point, is a small town with a 500-foot sport fishing pier. A number of motels are in the town to handle the many tourists that visit Hearst Castle.

Prominent **Hearst Castle,** 2.7 miles NE of San Simeon, is the former palace of the late William Randolph Hearst; it is now a State Historical Monument. The structure is lighted at night.

The coast from San Simeon Point for 5 miles NW to Point Piedras Blancas, is low, with numerous detached rocks lying in some cases over 0.5 mile offshore and usually well marked by kelp.

Point Piedras Blancas is a low rocky point projecting about 0.5 mile from the general trend of the coast. **Piedras Blancas Light** (35°39.9'N., 121°17.1'W.), 142 feet above the water, is shown from a 74-foot white conical tower with flat top at the point. A radiobeacon is at the light, and a lighted horn buoy is 1.5 miles SW of the light.

Piedras Blancas are two large white rocks, 74 and 31 feet high, 500 yards offshore and about 0.8 mile E of the point. From the S they look like one rock.

Outer Islet, a large and prominent white rock 110 feet high, is 0.25 mile W of the point. In hazy weather this rock is sometimes visible from the NW and W when the light cannot be seen.

Anchorage for a small vessel, with protection from NW winds, may be had under Point Piedras Blancas in 4 to 5 fathoms, sandy bottom, with the light about 0.2 mile bearing 280°.

A bank covered 11 fathoms, 3 miles WNW from Piedras Blancas Light, has been reported breaking in a heavy W swell.

From Point Piedras Blancas for 6 miles NNW to the mouth of the San Carpoforo Valley, the coast is low, with small bluffs and rolling treeless hills. Numerous rocks, fringed with kelp, extend well offshore. **Harlech Castle Rock,** 0.7 mile offshore and 1.5 miles NW of Piedras Blancas Light, is the outermost rock and uncovers 1 foot; it is not usually marked by kelp. A shoal covered 2¾ fathoms, 0.5 mile NW of this rock, is surrounded by 10 to 12 fathoms.

La Cruz Rock, 48 feet high and fairly prominent, is 3 miles NNW of Piedras Blancas Light and just S of Point Sierra Nevada. A sandy beach inshore from the rock is a fair landing place in heavy NW weather. This stretch of beach is relatively free from breakers in NW weather. There is a suitable anchorage for small boats E of the N limits of the rock in heavy NW or light S weather.

Point Sierra Nevada, a low inconspicuous bluff, is named for the steamship SIERRA NEVADA, which stranded on the rock 400 yards NW of the point.

About 1.8 miles N of Point Sierra Nevada is a group of isolated buildings inland from **Breaker Point;** the point is not prominent nor easily identified.

Ragged Point, 6 miles N of Point Piedras Blancas, is a low projection readily identified, being the first point S of prominent San Carpoforo Valley; visible rocks and ledges extend about 0.3 mile W of the point.

From Ragged Point NW for 41 miles to the Big Sur River, the coast is very bold and rugged. The cliffs are 200 to 500 feet high, and the land rises rapidly to elevations of 2,500 to 5,000 feet within 2 to 3 miles from the coast. There are few beaches and few outlying rocks. The highway along the coast is plainly visible from seaward.

Two conspicuous landmarks lie between Ragged Point and Cape San Martin. **White Rock No. 1,** 39 feet high and rather sharp, is 0.5 mile offshore and 3.8 miles NW of Ragged Point, about 200 yards W of White Rock No. 1 is a rock awash. **White Rock No. 2,** 64 feet high and with a rounded top, is 0.2 mile offshore and 5.8 miles NW of Ragged Point.

Salmon Cone, 500 feet high, is a rocky butte close to the shore and 0.5 mile NE of White Rock No. 1. The cone is not conspicuous as it blends into the background.

Several deep narrow gulches indent the coast between Salmon Cone and Cape San Martin. Two of the most prominent, **Villa Creek** and **Alder Creek,** are crossed by conspicuous white bridges.

A pinnacle rock, covered 1¾ fathoms, is 1.7 miles SE of Cape San Martin and 0.5 mile offshore.

Whaleboat Rock, which uncovers 5 feet, and **Bird Rock,** 5 feet high, are about a mile SE of Cape San Martin; they are conspicuous only when close inshore. A white barn is prominent in a group of buildings on the bluff just N of these rocks.

Cape San Martin, 16 miles NW of Point Piedras Blancas, has a ragged precipitous seaward face and is readily identified by the **San Martin Rocks.** From S, the inner rock, which is 100 yards offshore, is the most prominent, being 144 feet high and white in appearance. The middle rock is 34 feet high and triangular. The outer rock is cone-shaped, 44 feet high, and 0.5 mile offshore. The W extremity of Cape San Martin is marked by a light.

Willow Creek bridge, 0.3 mile N of the light, is prominent from W.

From Cape San Martin for 9.5 miles to Lopez Point, the coast forms an open bight with rugged shores intersected occasionally by deep narrow valleys. There are a few detached rocks, but only two extend far from the shoreline.

Plaskett Rock is a large prominent white rock, 110 feet high, 2 miles N of Cape San Martin and 0.3 mile offshore.

Tide Rock, 4 miles N of Cape San Martin and 0.7 mile offshore, is awash and quite sharp; it is a menace in smooth weather as there is no breaker to indicate its position.

Lopez Point, 9.5 miles NW of Cape San Martin, is a narrow tableland, 100 feet high, projecting a short distance from the highland. **Lopez Rock,** 51 feet high, is 0.3 mile offshore and 0.8 mile NW of Lopez Point. A shoal covered 6 fathoms is 0.3 mile SW of Lopez Rock.

An open anchorage affording some protection from NW weather may be had about 1 mile SE of Lopez Point in 10 fathoms, sandy bottom. Smaller vessels may obtain better shelter by anchoring inside the kelp bed in about 5 fathoms, sandy bottom, with Lopez Point bearing about 287°. A rock covered 1¾ fathoms is in the kelp beds 0.5 mile SE of Lopez Point.

Harlan Rock, 10 feet high, is 0.3 mile offshore and 1.7 miles ESE of Lopez Point. The rock is conspicuous only when approaching the anchorage. A shoal covered ¾ fathom is 680 yards SE of Harlan Rock.

Several peaks are prominent behind Lopez Point. **Junipero Serra Peak,** 10 miles NE of Lopez Point, has pines on and near the summit. **Twin Peak** and **Cone Peak,** 4 miles NE of Lopez Point, are known as the twin peaks; they have scattered trees on their summits and are good landmarks even at night. An observation tower on the summit of Cone Peak is lighted when occupied.

From Lopez Point for 17.5 miles to Pfeiffer Point, the coast is rugged, and high mountains rise precipitously from the shore. The coastline makes in slightly, forming a shallow bight. Several hundred feet above the beach, the slopes are marked by numerous highway cuts, and the highway bridges over these are conspicuous from offshore.

Square Black Rock, 4 miles NNW of Lopez Point, is 62 feet high and has a conspicuous cleft in its center. It is the most prominent landmark visible from offshore between Lopez Point and Pfeiffer Point.

Dolan Cone, 4.5 miles NNW of Lopez Point, is white in appearance and 77 feet above the water.

Little Slate Rock, 7.5 miles NNW of Lopez Point, is 4 feet high; **Slate Rock** is 18 feet high. Both rocks are discernible only when close inshore.

A prominent dwelling, visible from the W and N, is on a bluff 5.5 miles ESE of Pfeiffer Point. Several conspicuous highway bridges cross the canyons. The highway leaves the coast about 3.5 miles ESE of Pfeiffer Point and does not appear again until N of Point Sur.

A deep submarine valley makes in from the S in the bight 13.5 miles NW of Lopez Point and 4.5 miles SE of Pfeiffer Point. The head of the canyon parallels the shore for about a mile and the 100-fathom curve lies only 500 yards from the shore.

Chart 18686.–Pfeiffer Point, 17.5 miles NW of Lopez Point and 6 miles SE of Point Sur, is 400 to 500 feet high; it is the seaward end of a long ridge 2,000 feet high, 1.5 miles NE of the point. The point presents a bold, precipitous, light-colored face to seaward. It is distinguished from the S by its color, and from N the pointed summit stands out. The point is more prominent from N than from S. **Sycamore Canyon** is immediately NW of the point.

Anchorage, affording fair protection in N and NW weather, may be had for small vessels about 0.9 mile ESE of Pfeiffer Point and 500 yards offshore in 8 fathoms, sandy bottom, with chain sufficient to clear the kelp line. This anchorage is used extensively by local fishermen. Access by land is difficult as the road is poor.

Cooper Point, 1.5 miles NW of Pfeiffer Point, is marked by a prominent pinnacle 172 feet high and an off-lying rock 18 feet high.

From the mouth of **Big Sur River,** 3.5 miles NW of Pfeiffer Point, to Point Sur, the shore is low, with sand beaches and dunes extending E. Submerged rocks and ledges extend 1 mile or more offshore in some places between Cooper Point and Point Sur.

False Sur, 1.2 miles SE of Point Sur Light, is a 206-foot rounded hillock of somewhat similar appearance to Point Sur, and during fog and low visibility may be mistaken for it.

Point Sur, 121 miles NW of Point Arguello and 96 miles SSE of San Francisco Bay entrance, is a black rocky butte 362 feet high with low sand dunes extending E from it for over 0.5 mile. From N or S, it looks like an island and in clear weather is visible about 25 miles. The buildings on the summit of Point Sur may confuse the stranger. **Point Sur Light** (36°18.4'N., 121°54.0'W.), 250 feet above the water, is shown from a gray stone tower on the seaward face of the point. A radiobeacon is at the station. The buildings of a U.S. Naval Facility for oceanographic research are about 0.5 mile E from the light.

Pico Blanco, 4.5 miles E of Point Sur, rises from the long ridge bordering the S side of Little Sur River. The pointed and white-topped peak is prominent in clear weather.

Sur Rock, 1.8 miles SSE from Point Sur Light and nearly 0.8 mile offshore, is awash. A shoal covered 2 fathoms, 0.3 mile W of Point Sur, breaks heavily in all but very smooth weather. About 0.5 mile SW from Sur Rock is a shoal covered 4½ fathoms that breaks in heavy weather. Extending 0.9 mile from Sur Rock toward Point Sur are many covered rocks that show breakers in moderately smooth weather. Foul ground lies between the rocks and the beach. These dangers are usually well marked by kelp, but it is a dangerous locality in thick or foggy weather, and vessels should stay in depths greater than 30 fathoms.

Chart 18680.–The coast trends NNW from Point Sur for 17 miles to Cypress Point, then NE for 4 miles to Point Pinos.

Monterey Bay is a broad open bight 20 miles wide between Point Pinos and Point Santa Cruz.

The shores decrease in height and boldness as Point Pinos is approached, while those of Monterey Bay are, as a rule, low and sandy. The valleys of Salinas and Pajaro Rivers, which empty into the E part of Monterey Bay, are marked depressions in the coastal mountain range and are prominent as such from a considerable distance seaward. From Point Santa Cruz the coast curves W and N for 23 miles to Pigeon Point, and then extends for 25 miles in a general NNW direction to Point San Pedro, the S headland of the Gulf of the Farallones.

Between Cypress Point and Point Pinos the coast is bold and the 30-fathom curve is less than 1 mile from shore in many places; deep submarine valleys extend into Carmel Bay and Monterey Bay. N of Monterey Bay, depths are more regular and the few dangers extend less than 1 mile from shore.

Chart 18686.–Just N of Point Sur (36°18.4'N., 121°54.0'W.), a sandy beach and bluff continue for 1.8 miles to **Little Sur River,** where the coast becomes bold, the 30-fathom curve lying in many cases less than 1 mile from shore. The highway returns to the coast just N of Point Sur and is visible from seaward until it reaches Pinnacle Point. It is marked by several bridges.

Ventura Rocks, 2.2 miles N of Point Sur, are two rocks close together about 0.6 mile offshore. The N rock is conical-shaped and 12 feet high. It is fairly conspicuous when seen from the N with the sand bluff N of Point Sur as a background, but when seen from the S it is confused with the rocks near the beach and to the N. The S rock uncovers.

From the conspicuous valley of the Little Sur River for more than 7 miles to Soberanes Point, the coast, although moderately straight, is bold, rugged, and broken, with numerous detached rocks and covered ledges close inshore.

Bixby Landing, 4 miles N of Point Sur, is identified by a prominent concrete arch bridge across Bixby Creek; the bridge shows well to the W, but is obscured to the N. Less prominent is another concrete arch bridge across Rocky Creek, which is just N of Bixby Creek.

Soberanes Point projects slightly from the general trend of the coast. An isolated 200-foot grassy hillock lies immediately back of the point, and a grassy ridge extends inland to heights of 1,600 feet.

The 4.6-mile coastline from Soberanes Point to Pinnacle Point is rugged and broken, but becomes less precipitous and the mountain ridges lessen in height as Pinnacle Point is approached. Innumerable rocks and ledges extend in some cases over 0.3 mile offshore.

Lobos Rocks, a group of small rocky islets, are nearly 0.5 mile W of Soberanes Point. The two larger islets are white-topped, and each is about 40 feet high. From seaward they rise abruptly from 20 fathoms, but there is foul ground between them.

Mount Carmel (chart 18680), 7.3 miles NE of Point Sur, is round and bare on the summit. This peak and **Pico Blanco,** 4.5 miles E of Point Sur, sometimes can be seen when the lower land is covered by fog or haze.

Yankee Point, 2.5 miles N of Soberanes Point, projects 0.3 mile from the general trend of the coast. The seaward face is irregular and broken, with numerous detached rocks. **Yankee Point Rock,** 6 feet high, is 125 yards W of the point. A covered rock that generally breaks is 0.4 mile S of the point and the same distance offshore.

Pinnacle (Carmel) Point, the outer tip of **Point Lobos** and the S point at the entrance to Carmel Bay, is an irregular, jagged, rocky point 100 feet high. **Whalers Knoll,** the 200-foot-high hill 0.5 mile ESE of Pinnacle Point, is one of the prominent knobs on Point Lobos. **Sea Lion Rocks** are a group of rocks off the point. A rock, formerly known as Whalers Rock, is the farthest offshore of the group and is 0.5 mile SW of the point. It is 12 feet high, the most conspicuous of the group, and more prominent from the N than from the S.

The entire Point Lobos area is included in a State park reserve; rules prohibit landing anywhere but in **Whalers (Carmel) Cove,** the bight on the N shore 0.8 mile ESE of Pinnacle Point. Launching of small boats is allowed here; however, the kelp growth is quite heavy in the cove. (Contact the Chief Ranger at the Point Lobos State Park reserve for launching and anchoring regulations.)

Carmel Bay is a 2.8-mile-wide open bight between Pinnacle Point and Cypress Point. The beach in front of the city of Carmel is low, but the land on the S side of the bay is bare and mountainous, and the N side is hilly and heavily wooded.

Carmel Bay affords shelter in N and S weather to small craft having local knowledge. In N weather anchorage may be had in two coves on the N shore, **Pebble Beach** on the W and **Stillwater Cove** on the E. These are shallow kelp-filled bights, with rock and gravel bottom. Anchorage is in 1 to 3 fathoms, but local knowledge is necessary to avoid the dangers. Stillwater Cove has a landing at its head with 5 feet alongside. In S weather, anchorage may be had in Whalers Cove in 3 to 4 fathoms, rock or gravel bottom, but there is a rock covered 1⅝ fathoms near the middle of the cove.

Carmel Canyon, a deep submarine valley, heads in the SE part of Carmel Bay and has depths of 50 fathoms less than 0.2 mile from the beach. The bay is not recommended for strangers.

On the NE shore of Carmel Bay, and N of **Carmel River,** is the city of **Carmel.** The lights of Carmel are prominent on a clear night. The Carmel Mission at the S end of the town is a conspicuous structure.

Cypress Point, on the N side of the entrance to Carmel Bay, is comparatively low and extends about 2 miles beyond the general trend of the coast. The cliffs are steep, and numerous detached rocks are close under them. The point is heavily wooded to within 400 yards of its tip. **Cypress Point Rock,** 12 feet high, is 450 yards NW of Cypress Point and is prominent from either N or S. A lighted gong buoy is NW of the point.

Chart 18685.–From Cypress Point to Point Pinos, the coast trends NE for 4 miles. Numerous small rocks and ledges closely border the shoreline. The land is low, with the height of the cliff decreasing toward **Point Joe,** a rocky extension of the shoreline where the surf breaks heavily. From this point to Point Pinos, white sand dunes are conspicuous against the dark trees behind them, even in moonlight.

Point Pinos, on the S side of Monterey Bay, is low, rocky, and rounding with visible rocks extending offshore for less than 0.3 mile. The point is bare for about 0.2 mile back from the beach, and beyond that is covered with pines. **Point Pinos Light** (36°38.0′N., 121°56.0′W.), 89 feet above the water, is shown from a 43-foot white tower on a dwelling near the N end of the point. A radiobeacon is at the light, and a fog signal is 450 yards NW. A lighted whistle buoy is about 0.7 mile off the point.

Monterey Bay, between Point Pinos and Point Santa Cruz, is a broad 20-mile-wide open roadstead. The shores are low with sand beaches backed by dunes or low sandy bluffs. **Salinas Valley,** the lowland extending E from about the middle of the bay, is prominent from seaward as it forms the break between the Santa Lucia Range S and the high land of the Santa Cruz Mountains N. The bay is free of dangers, the 10-fathom curve lying at an average distance of 0.7 mile offshore. The submarine **Monterey Canyon** heads near the middle of the bay with a depth of over 50 fathoms about 0.5 mile from the beach near Moss Landing. Shelter from NW winds is afforded at Santa Cruz Harbor and Soquel Cove, off the N shore of the bay, and from SE winds at Monterey Harbor, off the S shore. The tidal currents are weak.

Weather.–Sea fog is a problem on the bay from about July through September. It is worse over open waters and along the exposed E shore. Around Monterey Harbor in the S and Santa Cruz Harbor in the N, fog reduces visibility to less than 0.5 mile on 4 to 8 days per month during the worst period. Close to shore, cloudiness begins to increase and descend in the evening by 2100 or 2200. Low clouds or fog cast a pall over the E shore. Around sunrise, conditions begin to improve, and, by 0900, visibilities are usually better than 0.5 mile. The best conditions occur in the early afternoon, when visibilities are less than 3 miles and cloud ceiling are less than 1,500 feet only 10 to 20 percent of the time. Clear skies and excellent visibility occur 15 to 20 percent of the time. Poor conditions can be expected over the bay and along exposed coasts on 10 to 15 days per month during July, August, and September. Moss Landing is an exposed location, and fog signals operate about 25 percent of the time in August. Radiation fog occurs infrequently from the fall through spring.

Gales are rare over Monterey Bay; extreme gusts have been reported at 40 to 50 knots from October through May. Winds of 17 knots or more occur 1 to 4 percent of the time from November through March; they are rare during July, August, and September. Prevailing winds are W, except in late fall and early winter, when E winds are as frequent. W through NW winds remain the predominant directions into October, when winds become more variable again.

Winter winds over the bay are variable. Winds from the ESE are as common as winds from the WNW, and, along the shore, calms occur more than 20 percent of the time. In late winter, WNW winds prevail. Strongest winter winds are often out of the S. During spring and summer, they are most likely from the NW. Gusts of 50 to 70 knots have occurred in winter and early spring.

A **restricted and a prohibited area** for an army firing range is in the SE part of the bay, and a naval operating area is in the NE part of the bay. (See 204.205, chapter 2, for limits and regulations.)

Pacific Grove, a summer resort just SE of Point Pinos, has no commercial wharves.

Monterey Harbor, 3 miles SE of Point Pinos, is a compact resort harbor with some commercial activity and fishing. The port formerly was the home base of a large purse seine sardine-fishing industry, but most of the canneries are now closed. Depths of more than 20 feet are available in the outer harbor and entrance, and 10 to 6 feet in the small-boat basin. There are many sport-fishing landings, and the small-craft basin provides good shelter for about 425 boats.

Monterey, a colorful and picturesque city on the W side of the harbor, was the capital of California under Mexican rule and for sometime after it became a State. The old adobe custom house is still standing near the waterfront and is now used as a historical museum.

Prominent features include the granite **Presidio Monument** on the brow of a barren hill and a radio tower 0.6 mile N of the monument.

A large red-roofed building is conspicuous on a bluff above the shore about 4 miles NE from Monterey Harbor Breakwater Light 6 at the head of Monterey Harbor. Two radio towers just inshore from the sand dunes at **Marina,** 6.5 miles NE from the breakwater, are conspicuous in the S part of Monterey Bay. An aerolight at Monterey Peninsula Airport is 1.9 miles ESE of Monterey Harbor Breakwater Light 6. Another aerolight is 7.3 miles NE of the breakwater light.

COLREGS Demarcation Lines.–The lines established for Monterey Harbor are described in 80.1215, chapter 2.

Monterey Harbor breakwater at the head of Monterey Harbor is about 1,700 feet long. This affords excellent protection in NW weather. However, an occasional surge makes in from the entrance during the winter. The outer end of the breakwater is marked by a light. A fog signal is at the light. Loud-barking sea lions usually occupy the breakwater during the day.

Special anchorages are S and SE of the breakwater. (See 110.1 and 110.126, chapter 2, for limits and regulations.)

Tides.–The mean range of tide at Monterey is 3.5 feet, and the diurnal range of tide is 5.3 feet. A range of about 8.5 feet may occur on days of maximum tides. The lowest low water is about 2.5 feet below mean lower low water.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Monterey is a **customs station.**

Coast Guard.–The Monterey **Captain of the Port** and a **vessel documentation office** are in Monterey. (See appendix for addresses.)

Harbor regulations.–The harbor is owned by the city of Monterey and under the control of a harbormaster. His office is in a trailer about 150 yards W of the foot of Wharf No. 2. Transients should report to the harbormaster for berth assignments. The speed limit in the harbor is 3 knots.

Wharves.–Municipal Wharf No. 2, the E municipal wharf, is 1,600 feet long and 86 feet wide at the outer end; depths alongside the outer E and W sides are 24 feet. Freight and supplies are handled by trucks directly to the wharf; a 2-ton hoist is available at the wharf.

Municipal Wharf No. 1, called Old Fishermans Wharf, 300 yards W, is lined with restaurants and shops. A crane hoist here can lift boats up to 8 tons for ordinary repairs.

Supplies.–Gasoline, diesel fuel, water, and ice are available at Municipal Wharf No. 2; marine supplies can also be obtained.

Communications.–Monterey has good rail, air, and highway connections with San Francisco and points S.

Moss Landing Harbor, on the E shore of Monterey Bay 12.5 miles NE of Point Pinos and just N of the small town of **Moss Landing,** is a good harbor of refuge. The harbor is used by pleasure craft and a fishing fleet of about 200 boats. The harbor has 375 berths.

Prominent features.–The two huge stacks at a large powerplant near the harbor are the dominating landmarks on Monterey Bay. The stacks are 528 feet high and are marked by flashing red lights. Other stacks at the powerplant and at the nearby mineral processing plant are less conspicuous. A white elevated water tank S of the inner turning basin is prominent.

Two radio towers are prominent at **Palm Beach,** a small resort and camping ground back of the sand dunes 4 miles N of Moss Landing.

An area of turbulent water caused by water discharge from the powerplant is marked by a private buoy 250 yards SW from the south jetty light; the turbulence may be dangerous to small craft.

Fuel oil for the powerplant is received through a submerged pipeline marked by a private buoy 0.8 mile NW from the harbor entrance.

COLREGS Demarcation Lines.–The lines established for Moss Landing Harbor are described in 80.1220, chapter 2.

Channels.–The entrance channel into the harbor is through a jettied entrance to an outer turning basin about 0.3 mile above the entrance, thence S through an inner channel to an inner turning basin about 0.8 mile above the entrance. In January-June 1981, the midchannel controlling depth was 8 feet in the entrance channel to the outer turning basin, with 9 to 15 feet in the basin, thence 11 feet at midchannel to the inner basin, with 8½ to 13 feet in the basin. The entrance channel is marked by a buoy and a lighted range. The jetties are marked by lights on their outer ends, and the inner channel is marked by lights, buoys, and a daybeacon. A radiobeacon and a fog signal are about 125 yards NE of the south jetty light. Shoaling usually occurs on the S side of the entrance between the jetties; vessels should favor the N side of the channel when entering.

A channel, privately marked by buoys and a range, leads N from the outer turning basin to a private yacht club basin. There are depths of about 8 feet in the channel and about 9 feet in the basin.

Anchorage.–The anchorage off Moss Landing Harbor is unprotected, but the holding ground is good.

Weather.–The prevailing winds are NW, but there are a few SE winds and N gales during the winter. (See Weather, chapter 3, for further information.)

Harbor regulations.–The harbor is administered by the Moss Landing Harbor District and is under the control of a harbormaster. His office is near the inner turning basin. Transients should report to the harbormaster for mooring assignments.

Supplies and Repairs.–Gasoline, diesel fuel, water, ice, and some marine supplies can be obtained; a 100-ton marine railway is available for repair work.

Monterey Wind Gap.–The great mountain barriers N and S of Monterey Bay and the receding shoreline to the E offer a broad entrance to the cold foggy NW winds of the summer, and they drive over the bay and well into Salinas Valley to the S.

Soquel Cove is in the NE part of Monterey Bay, E of Santa Cruz Harbor. Fair shelter is afforded in NW weather, but the cove is open to S weather. The best anchorage is SE of the mouth of **Soquel Creek** in 5 to 6 fathoms, sandy bottom.

At **Seacliff Beach,** 0.5 mile W of **Aptos Creek,** a concrete ship has been beached and filled with sand. The pleasure pier for sport fishing extends from ship to the shore.

A small fishing and pleasure wharf at **Capitola,** on the NW side of Soquel Cove, has 11 feet alongside the landing at the outer end. There are facilities to hoist out small boats. Houses on the bluffs about 1.5 miles E of Capitola are prominent. Three radio towers 0.6 mile NW of **Soquel Point** are conspicuous from the E and S.

Point Santa Cruz, 20 miles N of Point Pinos and 2.5 miles W of Soquel Point, consists of cliff heads about 40 feet above the water. The area back of the point is flat, but rises in terraces to higher land. There are two flat rocks close under the point; the outer one is the higher.

Santa Cruz Light (36°57.1'N., 122°01.6'W.), 60 feet above the water, is shown from a 39-foot white lantern house on a square brick tower attached to a brick building near the S extremity of the point. A lighted whistle buoy is 1.1 miles SE of the light.

The city of **Santa Cruz** is on the NW shore of the bay. **Seabright, Twin Lakes,** and **Pleasure Point,** suburbs of Santa Cruz, are along the beach to the E.

Santa Cruz Harbor, on the NW shore of Monterey Bay between Point Santa Cruz and Soquel Point, has a municipal pier and small-craft harbor.

The Santa Cruz Municipal small-craft harbor in **Woods Lagoon,** just E of Seabright, has slips and end-ties for about 800 small craft.

Prominent features.–The Casino building and the roller coaster immediately E of the town are prominent.

COLREGS Demarcation Lines.–The lines established for Santa Cruz Harbor are described in 80.1225, chapter 2.

Channels.–The entrance to the small-craft harbor is protected by jetties; a light, fog signal, and radiobeacon are at the end of the W jetty. The least clearance for the bridges between the lower and upper basins is 18 feet.

The Santa Cruz Port Director advises that extensive shoaling occurs at the harbor entrance between late November and early April. Persons unfamiliar with the area should contact the Port Director's office prior to entering the harbor; a radio guard on VHF-FM channels 12 (156.60 MHz), 16 (156.80 MHz), and 73 (156.675 MHz) is maintained from 0800 to 1700 daily. The Santa Cruz Port Director further recommends that mariners without local knowledge should not attempt to enter the harbor during periods of high ground swells.

Inside the entrance, in 1974-June 1981 controlling depths were 8½ feet to about the midpoint of the lower basin, thence in May 1973, 7½ feet to the fixed bridges. From the bridges, depths of 10 feet were reported in the upper basin channel.

In January 1982, it was reported that severe shoaling had made the harbor extremely hazardous. Caution should be exercised.

Anchorage.–Good anchorage can be had anywhere off the pier in 5 fathoms, sand bottom. Santa Cruz Harbor provides good shelter in N weather, but in NW weather a heavy swell is likely to sweep into the anchorage. In S weather there is no protection in the harbor; vessels must run for Monterey or Moss Landing Harbor or take refuge in Santa Cruz Municipal small-craft harbor.

Harbor regulations.–The harbor is administered by the Santa Cruz Port District Commission. Transient vessels should report to the harbor office at the SE corner of the small-craft harbor, for berth assignments.

A patrol boat operates in the harbor and monitors VHF-FM channels 12 (156.60 MHz), 16 (156.80 MHz), and 73 (156.675 MHz). The patrol boat will guide vessels into the harbor on request.

Wharves.–The municipal pier, 0.8 mile W of the entrance to the small-craft harbor, is over 0.4 mile long with 26 feet alongside at its outer end; a private seasonal fog signal in on the outer end of the pier. Landings can be made in all but heavy S weather, but few vessels land except fishing boats. Due to the ocean swell sweeping around the point, there is usually considerable surge. The pier is lined with restaurants and stores. A small-boat hoist is on the pier.

Supplies.–Gasoline, diesel fuel, and marine supplies are available. A launching ramp and two yacht clubs are in the harbor.

Repairs.–A repair yard at the harbor has a 40-ton mobile lift that can handle vessels for hull and engine repairs. Electronic repairs are also available.

Communications.–Santa Cruz has highway and rail connections with San Francisco and the interior.

Chart 18680.–From Point Santa Cruz the coast trends W about 4 miles to Needle Rock Point and thence NW to Point Ano Nuevo. The shoreline rises from high bluffs, with a few intervening beaches, to a low flat tree-covered mountain range.

Needle Rock Point is 4 miles W of Santa Cruz Light; a slender pillar of rock stands a short distance seaward from the face of the cliffs; another lower pinnacle is about 200 yards E. Neither is distinguishable when abreast it.

Sand Hill Bluff, 6.5 miles W of Santa Cruz Light, is composed of sandstone cliffs about 50 feet high with a rounding irregular hillock of white sand near the edge of the cliffs; this hillock is white on the NW side, and is covered with brush and grass on the SE side. Neither this bluff nor Needle Rock Point is a good landmark.

The buildings of a large cement works at **Davenport,** 9 miles NW of Point Santa Cruz, are conspicuous. A tall concrete stack and aluminum-colored oil tank are prominent marks by day, and many lights are visible at night. The ruins of an old cement loading wharf are at the plant.

In 1975, shoaling to 10 fathoms was reported in 37°00.0'N., 122°30.1'W., about 14.5 miles W of Davenport.

Loma Prieta, a prominent flat-topped peak surmounting the high mountainous ridge 13 miles NE of Santa Cruz Light, is the predominating mountain feature of this section. A fire observation tower is on the top of the peak.

Waddell Creek, 14.5 miles NW of Point Santa Cruz, is in a narrow steep-sided valley. The high whitish bluffs, immediately N, are quite prominent.

Point Ano Nuevo, 18 miles NW of Point Santa Cruz, is formed by sand dunes, 20 to 100 feet high. Four wooden radio masts are on the point. A low black rocky islet is 0.3 mile off the point. Foul ground extends NW and SE from the islet. A white square 49-foot pyramidal skeleton tower is on the islet. Near the tower is a group of red-roofed white houses. A lighted whistle buoy is about 0.8 mile S of the tower.

Anchorage with protection from N and NW winds can be had in the bight S of the point in 8 fathoms, with the tower bearing 276°, distant 0.8 mile. The kelp bed and reef, extending a little over 0.5 mile SE from the islet, break the force of the swell.

The 5-mile coast between Point Ano Nuevo and Pigeon Point is low and rocky. **Pigeon Point,** 22.5 miles NW of Point Santa Cruz, is 50 feet high and rises in a gentle slope to the coastal hills. Several moderately large detached rocks extend 350 yards SW. Pigeon Point was named from the wreck at this place of the clipper ship CARRIER PIGEON.

Pigeon Point Light (37°10.9'N., 122°23.6'W.), 148 feet above the water, is shown from a 115-foot white conical tower on the end of the point. A radiobeacon is at the station. The light cannot be seen in the bight E of a line joining Pigeon Point and Pillar Point, 20 miles to the N. The light station buildings on Pigeon Point are white with red roofs. A group of farm buildings is about 0.5 mile E. A row of trees, conspicuous against a background of barren hills is about 500 yards NE of the light.

From Pigeon Point for 4 miles to **Pescadero Point,** the coast is nearly straight and is composed of reddish cliffs with numerous outlying submerged and visible rocks. A rocky patch covered 3 feet is about 0.8 mile S of Pescadero Point; a 6¼-fathom rocky patch is about 0.7 mile WSW of the point.

From **Pescadero Creek,** 1.5 miles N of Pescadero Point, the coast for 8 miles N becomes more broken and rugged, with yellow or white vertical cliffs. A prominent whitish cliff over 100 feet high is 7.5 miles N of Pescadero Point. About 9 miles N of the point is a prominent white building surrounded by numerous antenna poles.

The coast is broken by several small streams in deep steep-sided valleys. N of the high cliff, a low flat tableland extends N for 9 miles and then bends sharply W to Pillar Point, forming Half Moon Bay. The land consists generally of grass-covered rolling hills with ranch houses and cultivated ground in the foreground.

Chart 18682.–Pillar Point, 18 miles S of San Francisco entrance, is the S extremity of a 2.5-mile low ridge. Several black rocks extend over 300-yards S of the point; from N these appear as three or four, but from S as only one. **Half Moon Bay** comprises the bight from **Miramontes Point** on the S to Pillar Point on the N.

Pillar Point Harbor, in the N part of Half Moon Bay E of Pillar Point, is used by fishing vessels and pleasure craft. The harbor is well protected by breakwaters. The entrance, 130-yards wide, is between the E and W breakwaters. A light marks the end of the E breakwater, and a light and fog signal are on the end of the W breakwater. Depths inside are 2 to 20 feet, and greater depths are in the buoyed approach.

Prominent features.–A building and two white radar antennas at the U.S. Air Force radar site about 0.2 mile N of Pillar Point are conspicuous when approaching the harbor.

Caution is necessary in approaching Pillar Point Harbor because of the foul ground off the entrance. Rocks and reefs, marked by kelp and a lighted bell buoy, extend SE for over 1 mile from Pillar Point. **Southeast Reef,** extending from 1.5 to over 2 miles SE of Pillar Point, is covered 4 to 20 feet and has a pinnacle rock awash at extreme low water at the SE end. Mariners are advised to exercise caution in the vicinity of of Pillar Point in dense fog.

COLREGS Demarcation Lines.–The lines established for Pillar Point Harbor are described in 80.1230, chapter 2.

Routes.–Vessels from the S approach the harbor E of the lighted gong buoy marking Southeast Reef; vessels from the N use the buoyed opening between the Pillar Point foul ground and Southeast Reef.

Harbor regulations.–Pillar Point Harbor is administered by the San Mateo County Harbor District and under the control of a harbormaster. The harbormaster's office is at the head of the L-shaped pier.

There are only private mooring floats in the harbor so transients must anchor. The harbormaster should be consulted before tying alongside piers.

Wharves.–An L-pier 590 feet long with 13 feet alongside the 275-foot outer face is on the NE side of Pillar Point Harbor. Water and electricity are at the pier, and gasoline and diesel fuel are pumped at the landing. A skiff hoist is on the end of the pier.

Storm warning signals are displayed. (See chart.)

The 660-foot pier W of the L-pier has about 5 feet at the outer end. A surfaced launching ramp and parking area are near the inshore end of the E breakwater.

Chart 18680.–Montara Mountain, 4 miles N of Pillar Point and 2.5 miles inland, is covered with grass and bare trees. From S it shows as a long ridge with several small elevations upon it, but from NW it appears as a flat-topped mountain with four knobs on the summit. It is a prominent feature in approaching the entrance to San Francisco Bay.

Point Montara, 2.8 miles N of Pillar Point, is the seaward end of a spur from Montara Mountain and the NW extremity of the ridge forming Pillar Point. It terminates in cliffs about 60 feet high with numerous outlying rocks. Covered rocks and ledges lie 0.8 mile W of the point and extend in a NW direction for about 1.5 miles. This is a dangerous locality in thick weather, and extreme caution should be used when inside the 30-fathom curve.

Point Montara Light (37°32.2'N., 122°31.1'W.), 70 feet above the water, is shown from a 30-foot white conical tower on the point. A conspicuous white tank is near the station and in the daytime is more prominent. A lighted whistle buoy is 1.5 miles W of the light.

From Point Montara for 2.5 miles to Point San Pedro the coast is bold and rugged, rising sharply from the sea to the spurs extending from Montara Mountain. **Devils Slide** is light-colored and is the highest bluff in this locality. The highway cuts are distinctive features in the bluffs. There are no outlying rocks or dangers other than those off Point Montara.

Point San Pedro is a dark, bold, rocky promontory, 640 feet high. It is the seaward termination of Montara Mountain and is an excellent mark in clear weather from either N or S. A large triple-headed rock, about 100 feet high and white on its S face, projects 0.3 mile W from the point. A rocky area, which breaks in a heavy swell, is reported to exist about a mile N of the point.

7. SAN FRANCISCO BAY, CALIFORNIA

Chart 18640.–San Francisco Bay, the largest harbor on the Pacific coast of the United States, is more properly described as a series of connecting bays and harbors of which San Francisco Bay proper, San Pablo Bay, and Suisun Bay are the largest. Depths of 29 feet and over are available for deep-draft vessels to San Francisco, Oakland, Alameda, Richmond, and Redwood City in San Francisco Bay proper; to Stockton on the San Joaquin River; and to Sacramento through the lower Sacramento River and a deepwater channel. Much of the local navigation is by light-draft vessels and barges.

The extensive foreign and domestic commerce of San Francisco Bay is handled through the several large ports which are the terminals for many transpacific steamship lines, airlines, and transcontinental railroads.

The E shore of San Francisco Bay proper is low except for rolling grassy hills in the N part and extensive marshes intersected by numerous winding sloughs in the S part. The W shore N of the entrance is much bolder than the E shore where there are only a few stretches of low marsh. Below San Francisco, marshes and flats intersected by numerous sloughs extend to the S end of the bay.

The Coast Guard Captain of the Port, San Francisco, has ordered that all ships anchored in San Francisco Bay maintain a radio listening watch on VHF-FM channel 13 (156.65 MHz) when the wind is 20 knots or greater. Any ship not equipped with channel 13 shall maintain a listening watch on VHF-FM channel 16 (156.80 MHz).

COLREGS Demarcation Lines.–The lines established for San Francisco Bay are described in 80.1250, chapter 2.

A Traffic Separation Scheme (San Francisco) has been established off the entrance to San Francisco Bay. (See chart 18645.)

The Scheme is composed basically of **directed traffic areas** each with one-way inbound and outbound **traffic lanes** separated by defined **separation zones; a precautionary area;** and a **pilot boat cruising area.** The Scheme is recommended for use by vessels approaching or departing San Francisco Bay, but is not necessarily intended for tugs, tows, or other small vessels which traditionally operate outside of the usual steamer lanes or close inshore.

The Traffic Separation Scheme has been designed to aid in the prevention of collisions at the approaches to major harbors, but is not intended in any way to supersede or alter the applicable rules of the road. Separation zones are intended to separate inbound and outbound traffic lanes and to be free of ship traffic, and should not be used except for crossing purposes. Mariners should use extreme caution when crossing traffic lanes and separation zones.

When not calling at San Francisco mariners are urged to sail direct between Point Arguello and Point Arena so as to pass the San Francisco Bay area to the W of the Farallon Islands and clear of the San Francisco Traffic Separation Scheme. In this manner through coastwise traffic will avoid crossing the directed traffic areas and/or precautionary area.

The **precautionary area** off the entrance to San Francisco Bay is inscribed by a circle with a radius of 6 miles centered on San Francisco Approach Lighted Horn Buoy SF (37°45.0'N., 122°41.5'W.) with the traffic lanes fanning out from its periphery. The W half of the circle has depths of 15 to 30 fathoms, the E half has lesser depths of 4 to 21 fathoms. Extreme caution must be exercised in navigating within the precautionary area inasmuch as both incoming and outgoing vessels use the area in making the transition between San Francisco Main Ship Channel and one of the established directed traffic areas.

A circular **separation zone** with a one-half-mile radius, centered on the San Francisco Approach Lighted Horn Buoy SF, has been established in the precautionary area of the San Francisco Traffic Separation Scheme. This zone has been established for the protection of the lighted horn buoy.

Mariners are cautioned that large navigational buoys (LNB) cannot be safely used as leading marks to be passed close aboard and are requested to stay outside the separation zone.

The **pilot boat cruising area** is about 1 mile E of the San Francisco Approach Lighted Horn Buoy SF. (See pilotage for San Francisco Bay, this chapter.)

Northern Directed Traffic Area:

Traffic Lane, Inbound.–The N approach to San Francisco is between Point Reyes and the Farallon Islands through the N inbound traffic lane that tapers from 1.7 miles to 1 mile wide in its length of about 15.4 miles. Entering the traffic lane at a point in about 37°55.0'N., 123°05.2'W., a course of **120°** follows the centerline of the traffic lane to the junction with the precautionary area; thence an ESE course for about 7 miles leads to the pilot boat cruising area. The least known depth in the traffic lane is 29 fathoms.

Traffic Lane, Outbound.–The N exit from San Francisco Bay by outbound vessels is 6 miles 312° from the San Francisco Approach Lighted Horn Buoy SF through the N outbound traffic lane that expands from 1 mile to 1.7 miles wide in its length of about 15.4 miles. A course of **305°** follows the centerline of the traffic lane to its end; thence steer usual courses to destination. Least known depth in the traffic lane is 25 fathoms.

Separation Zone.–The N separation zone between the inbound and outbound traffic lanes tapers from

1.7 miles wide at its outer end to 1 mile wide at its junction with the precautionary area and is centered on a line bearing 302½° and passing through San Francisco Approach Lighted Horn Buoy SF and San Francisco Northern Traffic Lane Lighted Bell Buoy C (37°48.2′N., 122°47.9′W.).

Main Directed Traffic Area:

Traffic Lane, Inbound.–The SW approach to San Francisco Bay is SE of the Southeast Farallon Island through the main inbound traffic lane which tapers from 1.7 miles to 1 mile wide in its length of about 9.4 miles. Entering at a point in about 37°35.8′N., 122°56.9′W., a course of **058½°** follows the centerline of the traffic lane to the junction with the precautionary area; thence a NE course for about 6.7 miles leads to the pilot boat cruising area. The least known depth in the traffic lane is 28 fathoms, except for the charted wreck 6.7 miles 226° from San Francisco Approach Lighted Horn Buoy SF which has a minimum depth of at least 11 fathoms.

Traffic Lane, Outbound.–The SW exit from San Francisco Bay by outbound vessels is 6 miles 244° from the San Francisco Approach Lighted Horn Buoy SF through the main outbound traffic lane that expands from 1 mile to 1.7 miles wide in its length of about 8.8 miles. A course of **247°** follows the centerline of the traffic lane to its end; thence steer usual courses to destination. The least known depth in the traffic lane is 29 fathoms.

Separation Zone.–The main separation zone between the inbound and outbound traffic lanes tapers from 1.7 miles wide at its outer end to 1 mile wide at its junction with the precautionary area and is centered on a line bearing 242½° from San Francisco Main Traffic Lane Lighted Gong Buoy B (37°41.5′N., 122°47.6′W.).

Southern Directed Traffic Area:

Traffic Lane, Inbound.–The S approach to San Francisco Bay is through the S inbound traffic lane that tapers from 1.7 miles to 1 mile wide in its length of about 13.1 miles. Entering at a point in about 36°27.0′N., 122°33.6′W. a **343°** course follows the centerline of the traffic lane to the junction with the precautionary area; thence a NNW course for about 5.7 miles leads to the pilot boat cruising area. In June 1981, a sunken wreck was reported in the inbound traffic lane in about 37°37.0′N., 122°37.5′W. Least known depth in the traffic lane is 16 fathoms.

Traffic Lane, Outbound.–The S exit from San Francisco Bay for outbound vessels is 6 miles 175° from the San Francisco Approach Lighted Horn Buoy SF through the S outbound traffic lane that expands from 1 mile to 1.7 miles wide in its length of about 12.3 miles. A course of **169°** follows the centerline of the traffic lane to its end; thence steer usual courses to destination. Least known depth in the traffic lane is 22 fathoms.

Separation Zone.–The S separation zone between the inbound and outbound traffic lanes tapers from 1.7 miles wide at its outer end to 1 mile wide at its junction with the precautionary area and is centered on a line bearing 166° and passing through San Francisco Approach Lighted Horn Buoy SF and San Francisco Southern Traffic Lane Lighted Whistle Buoy A (37°39.2′N., 122°39.7′W.).

In 1975, shoaling to 10 fathoms was reported in 37°00.0′N., 122°30.1′W., about 17.5 miles S of the S end of the Southern Directed Traffic Area. (See chart 18680.)

Vessel Traffic Service (San Francisco) has been established in the San Francisco Bay area. (See charts 18649 and 18654.) The service is composed of one-way **traffic lanes** separated by a **separation line, a precautionary area, a limited traffic area,** a **recreation area,** and a **vessel traffic center.**

The vessel traffic center incorporates the functions of the former Coast Guard Harbor Advisory Radar. The center, operated continuously by the Coast Guard, maintains communications with vessels via VHF-FM radiotelephone and monitors the position and movements of vessels by shore-based radars and position reports.

The purpose of the vessel traffic service is to enhance the safety of navigation in the San Francisco Bay by reducing the potential for vessel collisions and groundings. This is accomplished by, the routing of traffic so that unavoidable crossing and meeting situations take place under the most favorable conditions, the relay of navigational safety information collected by the Vessel Traffic Center to the masters or others in charge of the navigation of vessel, and the encouragement of mutual planning via bridge-to-bridge radiotelephone. It is not the function of the Vessel Traffic Center to direct the movement of vessels, but to enhance the ability of the master or person in charge of a vessel to exercise his control of the vessel most effectively and safely. This service is not intended in any way to supersede or alter applicable Rules of the Road.

The service is voluntary and is recommended for all vessels of over 300 gross tons operating within the area covered by this system. Recreational craft are generally not included, except when they choose to use the traffic lanes.

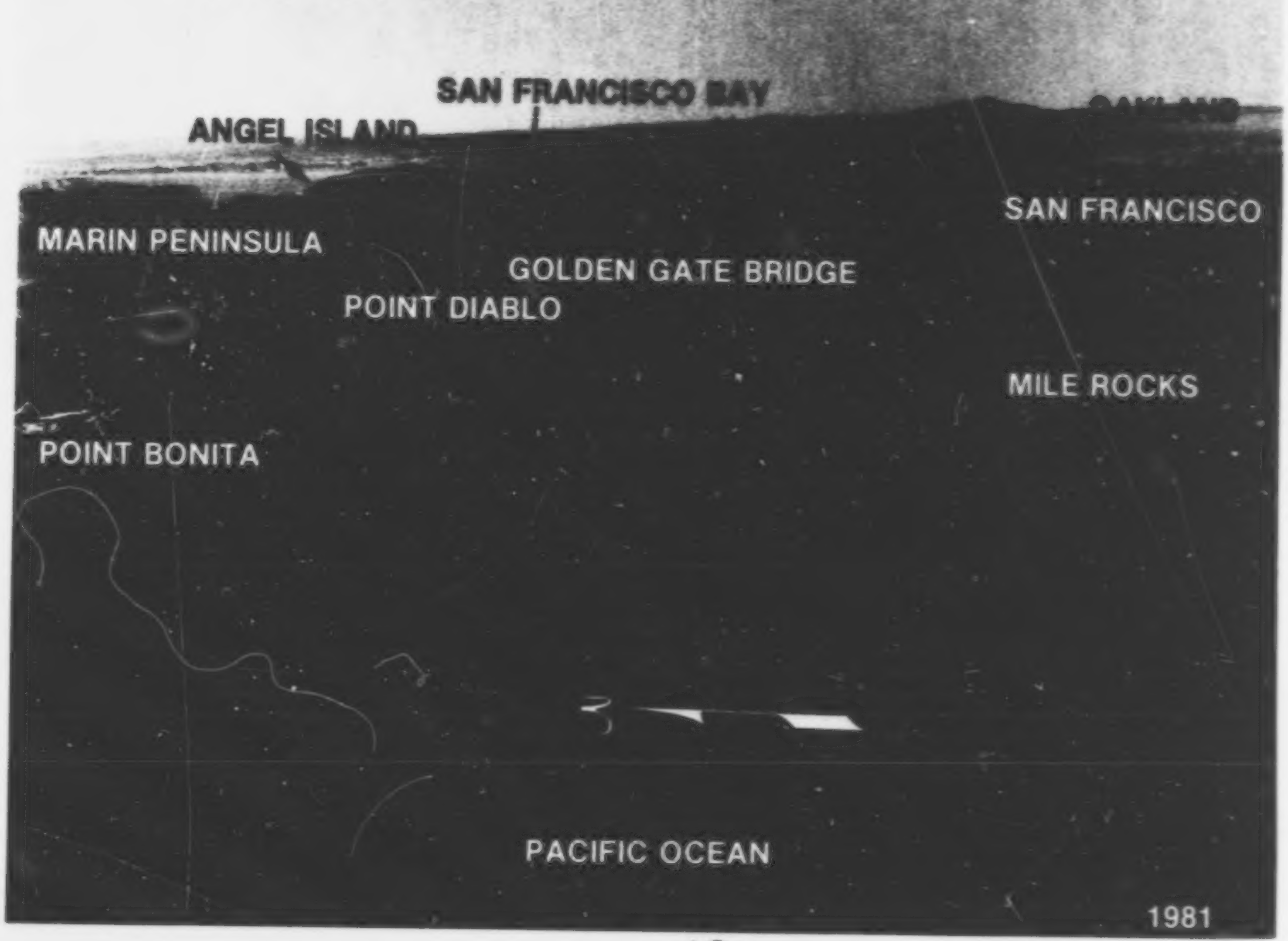
The Vessel Traffic Center maintains a continuous radiotelephone watch on VHF-FM channels 13 (156.65 MHz) and 16 (156.80 MHz). The center is also equipped to communicate on channels 12 (156.60 MHz) and 18 (156.90 MHz). The radio call is "San Francisco Traffic."

The traffic lanes, precautionary area, and recreation area are shown on the NOS charts of the bay area. For a complete detailed description of the system, mariners should obtain the latest edition of the U.S. Coast Guard's **Operating Procedures San Francisco Vessel Traffic Service.**

Chart 18645.–The entrance to San Francisco Bay is through **Gulf of the Farallones** and the narrow Golden Gate. The gulf extends from Point San Pedro on the S for 34 miles to Point Reyes on the N, and has a greatest width of 23 miles from Farallon Islands on the W to the mainland.

In clear weather many prominent features are available for use in making San Francisco Bay, but

SAN FRANCISCO BAY ENTRANCE, CALIFORNIA


SAN FRANCISCO BAY
ANGEL ISLAND
OAKLAND
SAN FRANCISCO
MARIN PENINSULA
GOLDEN GATE BRIDGE
POINT DIABLO
MILE ROCKS
POINT BONITA
PACIFIC OCEAN

1981

in thick weather the heavy traffic and the currents, variable in direction and velocity, render the approaches difficult and dangerous. Point San Pedro, Montara Mountain, Farallon Islands, Mount Tamalpais, and Point Reyes are prominent in clear weather and frequently can be seen when the land near the beach is shut in by low fog or haze. Radar navigation on the approach to San Francisco Bay is not difficult because of the numerous distinctive and high relief of targets available. Southeast Farallon Island, Point Reyes, Double Point, Bolinas Point, Duxbury Point, Rocky Point, Point Bonita, San Pedro Rock and Point, and Pillar Point are good radar targets.

The first 8 miles of coast from Point San Pedro to San Francisco Bay entrance consists of whitish bluffs that reach a height of 600 feet, then a 3-mile sand beach extends to the entrance. **Shelter Cove,** on the N side of Point San Pedro, provides shelter from the E storms with good holding ground in gray sand bottom. **San Pedro Rock,** close to the point and 100 feet high, also gives some protection in S weather.

The **Point Reyes/Farallon Islands National Marine Sanctuary** has been established to protect and preserve the marine birds and mammals, their habitats, and other natural resources in the waters surrounding the Farallon Islands and Point Reyes, and to ensure the continued availability of the area as a research and recreational resource. The sanctuary encompasses the waters off Bodega Head and Point Reyes, and the waters surrounding Farallon Islands. The sanctuary includes Bodega Bay but not Bodega Harbor. Recreational use of the area is encouraged. Regulations governing the use of the sanctuary are contained in 15 CFR 936. Any person in possession of a valid permit may conduct in the sanctuary the specific activity designated in the permit, including any activity specifically prohibited by the regulations, if such activity is (1) research related to the resources of the sanctuary, (2) to further the educational value of the sanctuary, or (3) for salvage or recovery operations.

Permit applications and requests for copies of the regulations shall be addressed to the Assistant Administrator for Coastal Zone Management, Sanctuary Programs Office, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, NW., Washington, D.C. 20235.

Farallon Islands, 23 miles W of San Francisco Bay entrance, are rocky islets extending NW for 7 miles. **Southeast Farallon,** the largest of the group, actually consists of two islands separated by a narrow impassable gorge. The larger E island is pyramidal in shape and 350 feet high; a small-boat landing is on the S side. **Farallon Light** (37°42.0'N., 123°00.1'W.), 358 feet above the water, is shown from a 41-foot white conical tower on the highest peak of the island. A radiobeacon is 280 yards S of the light. Dwellings are on the lowland on the S side of the island. **Fisherman Bay,** just N of Farallon Light, is somewhat protected by several rocky islets on the W side and affords anchorage in 8 fathoms in the outer part. Boats can be landed on a small sand beach on the largest islet.

Hurst Shoal, 0.6 mile SE of Farallon Light, is covered 22 feet and breaks only in heavy weather.

Middle Farallon, 2.3 miles NW of the light, is a 20-foot single black rock 50 yards in diameter; several rocks covered 5 to 7 fathoms are within 0.7 mile S and SW of it.

North Farallon, 6.5 miles NW of Farallon Light, consists of two clusters of bare precipitous islets and rocks from 91 to 155 feet high, 0.9 mile in extent, and 0.3 mile wide; submerged rocks surround them.

Fanny Shoal, 9.8 miles NW of Farallon Light and 14 miles SW of Point Reyes, is 2 miles in extent and covered 2 to 30 fathoms. **Noonday Rock,** covered 13 feet, rises abruptly from 20 fathoms and is the shallowest point of the shoal; it is the principal danger in the N approach to San Francisco Bay. A lighted whistle buoy is 0.6 mile W of the rock. Noonday Rock derives its name from the clipper ship that struck it in 1862 and sank within an hour, in 40 fathoms.

Cordell Bank, 27 miles NW of Farallon Light and 20 miles W of Point Reyes, is about 6 miles long and 3 miles wide; the bank is covered 20 to 40 fathoms, but depths increase rapidly outside it.

Chart 18647.–Point Reyes, 18 miles N of Farallon Light, is a bold, dark, rocky headland 612 feet high at the W and higher extremity of a ridge running in an E direction for 3 miles. It is an excellent radar target in thick weather. There is lowland N of the point, so that from N and S, and from seaward in hazy weather, it usually appears as an island. The point is visible for over 25 miles.

Point Reyes Light (37°59.7'N., 123°01.3'W.), 265 feet above the water, is shown from a steel pole on top of a square building on the W extremity of the point. A fog signal is at the light, and a radiobeacon is just NNE of the light. Two rocks, 275 yards W of the light, are covered about 3 feet and break in a moderate swell.

The **Point Reyes/Farallon Islands National Marine Sanctuary** has been established to protect and preserve the marine birds and mammals, their habitats, and other natural resources in the waters surrounding the Farallon Islands and Point Reyes, and to ensure the continued availability of the area as a research and recreational resource. The sanctuary encompasses the waters off Bodega Head and Point Reyes, and the waters surrounding Farallon Islands. The sanctuary includes Bodega Bay but not Bodega Harbor. Recreational use of the area is encouraged. Regulations governing the use of the sanctuary are contained in 15 CFR 936. Any person in possession of a valid permit may conduct in the sanctuary the specific activity designated in the permit, including any activity specifically prohibited by the regulations, if such activity is (1) research related to the resources of the sanctuary, (2) to further the educational value of the sanctuary, or (3) for salvage or recovery operations.

Permit applications and requests for copies of the

regulations shall be addressed to the Assistant Administrator for Coastal Zone Management, Sanctuary Programs Office, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, NW., Washington, D.C. 20235.

Drakes Bay, named after English explorer Sir Francis Drake, who anchored here in 1579, is NE of the 1-mile-long 200-foot-high, narrow peninsula that forms the easternmost part of Point Reyes. White cliffs commence at the SW angle of the bay and curve round to the NE for about 6 miles, ending at high white sand dunes. This curving shoreline forms Drakes Bay, which affords good anchorage in depths of 4 to 6 fathoms, sandy bottom, in heavy NW weather. Several lagoons back of the N shore empty into the bay through a common channel which is navigable by shallow-draft vessels with local knowledge.

Chimney Rock lies close under the outer end of the Drakes Bay peninsula. The area between Chimney Rock and the 5-fathom curve, 0.4 mile E and SE, breaks in moderate weather. A lighted whistle buoy is moored 0.6 mile SE of the rock.

Drakes Bay is used extensively in heavy NW weather and many fishing vessels operate from here during the season. Fuel and water are available at a fish wharf about midway along the inner side of the peninsula. In December 1981, a visible wreck was reported about 100 feet E of the fish wharf in about 37°59'41"N., 122°58'19"W.

From the sand dunes near the E part of Drakes Bay, cliffs 100 to 200 feet high extend 5 miles SE to **Double Point,** which has two high spurs, 0.4 mile apart, projecting 200 to 300 yards from the general coastline. A small 47-foot-high island is 300 yards off the NW spur, and a 54-foot-high rock is close under the longer and lower SE spur. From Double Point to Bolinas Point, about 3.5 miles SE, the coast is bold with high cliffs behind narrow sand beaches.

Bolinas Point, 15.3 miles SE of Point Reyes Light, is 160 feet high and the W extremity of the comparatively level tableland extending E to Bolinas Lagoon. An aerolight and numerous radio towers are 0.6 mile N of the point.

Duxbury Point, 16.5 miles SE of Point Reyes Light, is 160 feet high and yellow in color. The point is the S edge of the tableland W of Bolinas Lagoon.

Duxbury Reef, extending 1.2 miles SE of Duxbury Point, is long, narrow, and partly bare at low water. A ledge covered 30 to 36 feet extends from the reef to about 1.4 miles S of the point; a lighted whistle buoy is about 2 miles S of the point. Great care must be exercised in passing this area.

Chart 18649.–Bolinas Bay, E of Duxbury Point, is an open bight 3.5 miles wide between Duxbury Point and Rocky Point. The bay affords shelter in NW weather in 24 to 36 feet, sandy bottom. Care must be taken to avoid Duxbury Reef and the dangers extending up to 0.7 mile E of it. **Bolinas Lagoon** is separated from the bay by a narrow strip of sandy beach that is cut by a narrow shifting channel. The lagoon is shoal and entered only by small boats with local knowledge. The entrance has a depth of less than 3 feet.

Rocky Point is 100 feet high and shelving. Numerous detached rocks are within 200 yards of the high and precipitous cliffs on the S side of the point.

The 6-mile coast between Rocky Point and Point Bonita is very rugged and broken. The cliffs, which are seaward ends of spurs from Mount Tamalpais, rise to heights of over 500 feet and are cut by deep narrow valleys stretching inland.

Point Bonita, on the N side of the entrance to Golden Gate, is a sharp black cliff 100 feet high, increasing to 300 feet on its seaward face, 0.3 mile N. From NW it shows as three heads. **Point Bonita Light** (37°48.9'N., 122°31.7'W.), 124 feet above the water, is shown from a 33-foot white tower on the S head. A marker radiobeacon and fog signal are at the station. A tower and radar antenna operated by the San Francisco Vessel Traffic Service is prominent on the N head about 0.2 mile from the light. In summer the cliffs are white with bird droppings, but the first heavy rain restores them to their natural black color. There are a few detached rocks surrounding the point, but these do not extend over 200 yards offshore.

Bonita Cove, E of Point Bonita, is occasionally used as an anchorage by small vessels. The anchorage is close under Point Bonita in about 36 feet.

Mount Tamalpais, 7 miles N of Point Bonita, is visible for over 60 miles in clear weather. From S and W it shows three summits of which the westernmost is the highest and the easternmost with a lookout tower is the sharpest. The mountain is covered with bushes and scrub trees, giving it a dark appearance which contrasts strongly with the surrounding hills, especially in summer when the hills assume a light reddish color.

San Francisco Approach Lighted Horn Buoy SF (37°45.0'N., 122°41.5'W.), replacing San Francisco Lightship, is a large navigational buoy (LNB) 9 miles WSW of San Francisco Bay entrance. The buoy is painted red, shows a light 42 feet above the water, and is equipped with a radar reflector, radiobeacon, fog signal, and a radar transponder beacon (Racon). (See Racons, chapter 1, for additional information.)

San Francisco Bar, with depths less than 36 feet, extends in a semicircular shape from 3 miles S of Point Lobos to within 0.5 mile of the shore at Point Bonita; the extreme outer part is about 5 miles WSW of San Francisco Bay entrance. **Potatopatch Shoal,** on the N part of the bar, has depths reported to be less than 23 feet. The name is said to have originated from the fact that schooners from Bodega Bay frequently lost their deck load of potatoes while crossing the shoal. The S part of the bar has depths of 31 to 36 feet.

Warning.–It was reported that in heavy weather steep waves to 20 or 25 feet may be encountered on the bar. Vessels approaching Golden Gate are advised to stay well offshore and enter through the main ship channel. Sea conditions outside the bar may vary from conditions encountered on the bar. Furthermore, bar conditions may change considerably in a relatively short period of time. Mariners are advised to exercise extreme caution.

Golden Gate, the passage between the ocean and San Francisco Bay, is 2 miles wide at the W end between Point Bonita and Point Lobos, but the channel is reduced in width to 1.5 miles by Mile Rocks and to less than 0.7 mile by the Golden Gate Bridge pier. Depths in the passage vary from 108 feet to over 300 feet.

Point Lobos, the S entrance point to the Golden Gate, is high, rocky, and rounding with black rugged cliffs at its base. A large water tank is on the summit. The **Cliff House** is near the S part of the W face of the point; high and rocky **Seal Rocks** are just offshore.

Mile Rocks, 700 yards NW of the sharp projecting point off **Lands End** on the N face of Point Lobos, are two small 20-foot-high black rocks about 100 feet apart. **Mile Rocks Light** (37°47.6'N., 122°30.6'W.), 49 feet above the water, is shown from a white tower on the outer and larger rock; a fog signal is at the station, and the tower is floodlighted.

Passage between Mile Rocks and Point Lobos should not be attempted because of the covered and visible rocks extending over 300 yards from shore and the rocks covered 6 and 14 feet S of Mile Rocks Light.

The S shore of the Golden Gate extends in a gentle curve NE for 2 miles to Fort Point, forming a shallow bight called **South Bay.** The cliffs rise abruptly from narrow beaches, except near the middle of the bight where a valley terminates in a sand beach 0.3 mile long. Sailing craft are sometimes obliged to anchor here when becalmed, or when meeting an ebb current, to avoid drifting onto Mile Rocks, but the anchorage is uncomfortable and it is difficult to get underway from it.

Fort Point projects slightly from the high cliffs and is marked by a square red brick fort with a stone seawall in front. The fort, which is obscured by the S end of the Golden Gate Bridge, and 33 acres of land adjacent to the fort are part of the Fort Point National Historical Site. The docking of privately-owned vessels at Fort Point without permission is prohibited. Permission may be obtained from the General Superintendent, Golden Gate National Recreation Area, Fort Mason, San Francisco, Calif. 94123. A Coast Guard Station is E of the point.

The N shore of the Golden Gate is bold and rugged, with reddish cliffs rising abruptly from the water's edge to over 600 feet.

Point Diablo, 1.4 miles E of Point Bonita, rises abruptly from a 0.1-mile sharp projection to a height of over 200 feet with deep water on all sides. A light is shown from a white house on the end of the point; a fog signal is at the light.

The mile-long shore between Point Diablo and Lime Point forms a shallow bight with steep cliffs. Near the middle of the bight the cliffs are cut by a narrow valley which ends in a low beach at the shore.

Lime Point, 2.5 miles E of Point Bonita, is high and precipitous, and rises abruptly to a height of nearly 500 feet in less than 0.3 mile. A light is shown from a white brick building at the end of the point; a fog signal is at the light. The building is floodlighted.

Golden Gate Bridge, crossing the Golden Gate from Fort Point to Lime Point, has a clearance of 232 feet at the center of the 4,028-foot-wide channel span between the 740-foot-high supporting towers; the least clearance is 211 feet at the S pier. The center of the span is marked by a fixed green light with three fixed white lights in a vertical line above it and by a private fog signal; a private light and fog signals are on the S pier. Aero obstruction lights mark the tops of the bridge towers. (Do not rely on radiobeacon bearings when within 0.5 mile of the bridge.)

COLREGS Demarcation Lines.–The lines established for San Francisco Harbor are described in 80.1250, chapter 2.

Channels.–The principal approach to San Francisco Bay is through the buoyed **Main Ship Channel** over the bar on bearing **070°** toward Alcatraz Light. The project depth is 55 feet in the 2,000-foot wide channel. (See Notice to Mariners and latest edition of chart for controlling depths.) In April 1979, a sunken wreck was reported W of Buoy 8, in about 37°46'31"N., 122°35'17"W. Caution is advised when transiting the area.

From S, some coasters and fishing vessels drawing not more than 15 feet use buoyed **South Channel,** parallel to and 0.7 mile off the peninsula shore. A reported obstruction, covered 25 feet, is near the S end of the channel about 3.5 miles 192° from Mile Rocks Light.

From N, coasters and other vessels use buoyed **Bonita Channel,** between the E end of Potatopatch Shoal and the shore N of Point Bonita. The channel is narrowed to 0.2 mile by several rocky patches including **Sears Rock,** covered 19 feet, 1.2 miles NW of Point Bonita. The S portion of the channel is marked by a lighted range bearing **137°;** Mile Rocks Light is the front, and a light shown from a white building on the bluff is the rear; the rear light is visible 4° on each side of the range line.

Caution.–Vessels departing San Francisco Bay through Bonita Channel on the ebb current must use extreme caution when crossing the tide rip off Point Bonita. When the bow passes the rip the stern is thrown to port and, unless promptly met, the vessel will head straight for the rocks off the point. Vessels favoring Potatopatch Shoal too closely have reported a set toward it.

Neither South Channel nor Bonita Channel should be used by large vessels. Strangers wishing to cross the bar in thick weather should either wait for clearing or take a pilot. Fog is prevalent in the Golden Gate; radar is a great aid here.

It has been reported, however, that radar targets at the entrance to San Francisco Bay may be difficult to identify at times because of ghost echoes.

Supertankers and other vessels of extremely deep draft should arrive at the pilot station 1 hour before high water to cross the bar under the most favorable conditions.

Currents.–The currents at the entrance to San Francisco Bay are variable, uncertain, and at times attain considerable velocity. Immediately outside the bar there is a slight current to the N and W, known as the **Coast Eddy Current.** The currents at San Francisco Approach Lighted Horn Buoy SF- are described in some detail in the Tidal Current Tables. The currents most affecting navigation in this vicinity are the tidal currents. Across the bar the flood current converges toward the entrance and is felt sooner around Point Lobos and Point Bonita than across the Main Ship Channel. The ebb current spreads from the entrance over the bar, but the main strength is WSW, parallel with the S edge of the Potatopatch Shoal, and through the Main Ship Channel. In the Bonita Channel the ebb current is weak and of short duration; the flood current begins so early that during the last half of the ebb in the Golden Gate the current in Bonita Channel forms an eddy flowing SE around Point Bonita into Bonita Cove.

In the vicinity of Mile Rocks the currents attain considerable velocity within a few minutes after slack on both flood and ebb.

In the Golden Gate the flood current sets straight in, with a slight tendency toward the N shore, with heavy overfalls both at Lime Point and Fort Point when strong. It causes an eddy in the bight between Point Lobos and Fort Point. The ebb current has been observed to have a velocity of more than 6.5 knots between Lime Point and Fort Point, and it sets from inside the bay on the N side toward the latter point. Like the flood current, it causes an eddy in the bight between Fort Point and Point Lobos, and a heavy rip and overfall reaching about 0.25 mile S from Point Bonita. At the Golden Gate Bridge, large current eddies near the foundation piers cause ships to sheer off course.

Daily current predictions are given in the Tidal Current Tables. Hourly directions and velocities of the tidal current throughout the bay are shown on the Tidal Current Charts, San Francisco Bay.

Weather.–Winter winds, from about November through February, are variable. The procession of lows and highs brings frequent wind shifts and a great range of speeds. Calms occur from 15 to 40 percent of the time inside the bay and about 10 to 12 percent outside, while extreme winds of 50 knots with gusts of 75 knots have occurred in winter. Strongest winter winds are often out of the SE through SW, ahead of a cold front; sometimes strong W through N winds follow. Inside the bay, gales occur less than 1 percent of the time; this rises to around 2 percent in the ocean approaches.

Spring is often the windiest season, as reflected by the average wind speeds which range from about 6 to 12 knots inside the bay and up to 15 knots in the ocean approaches. While the extremes of winter are less likely, winds in the 17-to 28-knot range are more likely. Inside the bay, they occur 5 to 10 percent of the time, except at exposed locations like San Francisco International Airport, where winds pour through the San Bruno Gap at these speeds up to 25 percent of the time. Over the ocean approaches, they blow in this 17-to 28-knot range up to 40 percent of the time. Wind directions in spring become less variable as strong NW winds are generated by the Pacific High and reinforced by the sea breeze. SW and W winds are also common, as directions are deflected and channeled by the hills that surround the bay.

Summer winds are the most constant and predictable of all. Wind directions inside the bay are often local, but they are derived from the NW through N flow that persists outside the bay. At San Francisco International Airport, for example, winds are out of the W through NW 80 percent of the time; they usually back to the SW briefly in the early morning hours. In the S part of the bay, NW through N winds come funneling in through the San Bruno and Crystal Springs Gaps, aided by the onshore sea breeze. Along the E shores, these two factors result in a SW through NW flow. Over the N part of the bay, winds S of W prevail as the W flow through the Golden Gate is deflected N by topography and the heating of the Petaluma and Napa Valleys. If an area is completely protected from the prevailing flow, then a local onshore sea breeze will most likely develop. At Hamilton Air Force Base, summer winds out of the SE are most common.

This flow is usually so persistent that it continues through the night, with only a reduction in speed and perhaps a slight shift in direction. Only over the extreme S part of the bay does an offshore land breeze develop at night–and even here it is an infrequent occurrence.

Wind speeds over the bay increase during the day, owing to the strengthening of the sea breeze, and then fall off late at night. In general, depending upon exposure, winds blow at 3 to 10 knots from 2300 to 0900. During the morning hours, they increase to 6 to 15 knots. By early afternoon they are blowing at 14 to 20 knots, and this usually lasts until early evening, when they begin to drop off to nighttime levels. This same diurnal variation exists over the Gulf of the Farallones, with speeds sometimes reaching 25 knots or so during the afternoon.

Few changes take place in this summertime pattern, but one that occasionally disrupts it occurs when a high-pressure system gets situated over the Pacific Northwest. During these periods, a NE flow, sometimes very strong, comes whipping down the high plateaus of interior Washington and Oregon and Idaho, across the Cascades and Sierras through the coastal valleys and gaps in the inner coast range, to flood the bay region with warm and often hot, dry air. This flow clears the fog and stratus from the bay. Sometimes these NE winds are just enough to offset the prevailing flow, but at other times they blow fiercely across the area for a few days. They are so dry that many devastating brush fires have occurred in the bay area during these periods.

The summer conditions last through October, although they are not as persistent in October as the Pacific High weakens and occasional weather fronts affect the area.

Fog is a problem in the San Francisco Bay area, particularly in and around the Golden Gate. It is common in summer, occasional in winter and fall, and infrequent in spring. It can be local or widespread, thick or wispy, low or high. It may roll in rapidly from the sea or creep out from the land.

Fog ebbs and flows in cycles, daily and seasonal. They are long-term fluctuations not predictable enough to be termed cycles. Several foggy summers may be followed by several clear ones and one clear summer may be succeeded by a foggy one. Daily and seasonal cycles are more predictable.

Summer fog and stratus are advected off the Pacific by the prevailing onshore winds. They pour through the gaps and passes in the Coast Range and spread out over San Francisco Bay. Low stratus clouds are often referred to as high fog–an accurate term, since fog is simply stratus clouds touching the surface. This high fog is much more prevalent than dense surface fog in the bay.

Several conditions usually exist in summer to create this fog and stratus. The large Pacific High becomes well established off the coast. Its clockwise circulation generates a NW flow along the coast. This drives a cool California current S and even more importantly causes the upwelling of cold water close to the coast. On the E side of the high, air aloft subsides and warms, creating a layer of warm, dry air aloft (inversion). As warm, moist air moves across the Pacific and into the coastal region, it is chilled, first by the California current and then further by the cold pools of coastal water. If the air mass isn't too dry, then condensation through cooling causes fog and stratus to form from the surface, possibly to the height of the inversion (usually 500 to 1,500 feet). This situation occurs often enough to create a semipermanent fog bank off the coast during the summer.

Meanwhile, the inland valleys of California are heated by the summer sun, creating a large area of low pressure and setting up a flow from the ocean to the land–sea breeze. This intensifies the normal onshore flow, particularly during the afternoon and evening. This flow is blocked or deflected by the coast ranges except where there are gaps and passes. In the San Francisco Bay area, there are six major gaps, including the largest and only sea-level gap, the Golden Gate. It is the most influential feature in the climate of the bay. Minor gaps and passes are numerous also, resulting in very local conditions as cool, damp ocean air funnels through to the bay.

Under normal summer conditions, a daily cycle is evident. What happens in the Golden Gate usually occurs along the other passes to a lesser degree. Usually a sheet of fog appears in the early forenoon on either side of the bold headlands of the Golden Gate. It becomes more formidable as the day wears on. By late afternoon, it begins to move through the Golden Gate at a speed of about 14 knots, on the afternoon sea breeze. Once inside the bay, it is carried by local winds. Because of warm bay temperatures and other factors, it usually becomes high fog or stratus, E of Alcatraz. The height of the cloud base often lifts to 500 to 1,500 feet, and visibilities range from 3 to 7 miles on the E side of the bay. A narrow tongue of fog and stratus sometimes follows a local wind N into San Pablo Bay and then E into Carquinez Strait. Another night wind carries some fog and stratus into the S part of the bay, while the W wind pushes some clouds across the bay through the Golden Gate to Berkeley and the E shores. In a similar pattern, high fog moves over the bay through the other gaps and passes.

As the sun rises, fog and stratus burn off; first from the shore and near-shore areas and then gradually from the middle of the bay. In general, the N part of the bay is the last to be enveloped at night and the first to clear in the morning. Occasionally the stratus is so thick that the bay remains blanketed all day. It is most persistent in the central part of the bay from the Golden Gate to Berkeley.

The foggiest waters lie at the ocean approaches to the Golden Gate. In the Gulf of Farallones, fog signals operate 40 to 50 percent of the time during August, the worst month. In Bolinas and Drakes Bays, fog is constantly pushed in against the shores. At Point Reyes, the fog signal, 300 feet above mean sea level, operates about 45 to 50 percent of the time during July and August. At the entrance to the Golden Gate, fog signals blow about 30 percent of the time during an average August. Frequencies drop slightly in the channel itself, particularly at places like Anita Rock, which is somewhat sheltered by land. However, fog signals in the Golden Gate operate 15 to 25 percent of the time during August. July through September remain the foggiest months. Alcatraz represents the E extent of the frequent dense summer fog.

Once inside the bay, the extent of fog and stratus is determined by the winds, water temperature, and nearby land temperatures. Stratus continues across the bay to Berkeley. Often it is carried N through Southhampton Shoal into San Pablo Bay and then E into Carquinez Strait. Usually it is not touching the surface, so visibilities remain above 5 miles. Some cool, moist night air also reaches these N waters through Muir Woods Gap, Nicasio Gap, and Estero Lowland. While stratus touches the hills in these areas, it usually overhangs the bay. If nighttime cooling has been sufficient, it can build down to the surface. Fog is only likely to affect Richardson Bay and Raccoon Strait when the wind is a few points S of W. At Hamilton Air Force Base, August visibilities drop below 7 miles on about 6 days, but below 0.5 mile on only 1 day on the average. In N waters, the narrow stretch through Southhampton Shoal to Carquinez Strait is the most likely place to encounter fog.

While stratus is common at night along the Alameda-Oakland coast, dense fog is rare. Prevailing nighttime conditions are stratus at 500 to 1,900 feet with visibilities of 7 to 15 miles, occasionally dropping to 3 to 6 miles. At Moffett Field, August visibilities are reduced to less than 7 miles on about 8 days, but fall below 0.5 mile on 1 day, at most. Fog and most often stratus reach the S part of the Bay, mainly through the San Bruno and Crystal Springs Gaps. At San Francisco International Airport, visibilities drop below 0.5 mile on about 1 day in August.

There are times, however, when the whole bay becomes blanketed by fog. It can occur over a period of several days or a couple of weeks. On the average, it is a weekly cycle. At these times the indraft of air through the gaps is so strong that sea fog penetrates as far E as Sacramento and Stockton. If this flow continues for a few days, cooler ocean air replaces the warm valley air, finally causing the sea breeze mechanism to break down. Winds diminish, and the bay area clears for a few days. Slowly the valley reheats, and the process begins again.

Sea fog occurs infrequently in fall and winter. It is most likely with the warm, moist flow ahead of a frontal system, and it occurs most often near the approaches to and in the Golden Gate. A visibility problem that is most likely in fall is smog. It occurs when an inversion forms at low levels and traps pollutants. At times, the afternoon sea breezes push this smog from San Francisco across the bay to the Berkeley Hills, and a gray, noxious vapor can blanket this part of the bay and drop visibilities to less than 2 miles. If winds are light, San Francisco can become wrapped in a dense smog that reduces visibilities to below 0.5 mile. These conditions are most likely when a large high-pressure system settles over the bay area.

This high pressure also gives rise to radiation fog, particularly in late fall and winter. Under its clear skies and light winds, land temperatures fall rapidly at night. In low, damp places such as the Delta, this results in a shallow radiation fog. Because this fog forms most readily in regions where tules and other marsh plants grow, they are commonly called "**tule fogs.**" Often they are nothing more than a wisp a few feet deep. However, these fogs can build to several hundred feet deep and become dense, particularly if conditions persist for several days. The cool inland areas and the warmer ocean waters tend to create a land breeze on these occasions. In the early morning hours, the fog will drift seaward through the Carquinez Strait and other gaps in the Berkeley Hills, move across the bay to San Francisco and Marin, and roll slowly out the Golden Gate. It is often aided by radiation fog that has formed along the shores of the bay, or sometimes even over the bay itself. Most often, this relatively shallow fog burns off by late morning. Conditions conducive to this phenomenon usually last just a few days.

Tule fog is most likely in December and January, when calm conditions occur up to 40 percent of the time at some locations around the bay. In areas like Richardson Bay, Southampton Shoal, Raccoon Strait, and Carquinez Strait, fog signals operate 10 to 20 percent of the time on the average during these months. The addition of sea fog makes poor visibilities just as frequent in the Golden Gate and over its ocean approaches. Most shore points around the bay are affected much more by winter fog than summer fog. At Hamilton Air Force Base, visibilities drop below 0.5 mile on 5 to 8 days per month from October through February. At Oakland, Alameda, Moffett, and San Francisco Airports, visibilities are reduced below 0.5 mile on an average of 4 to 6 days per month during December and January.

Spring visibilities are usually excellent. March and April are the best months. Strong breezes and a lack of highs inhibit the formation of land fog, while fewer frontal passages reduce the chances of sea fog. Fog signals operate about 7 to 10 percent of the time in the Golden Gate and around the bay. At land stations, visibilities drop below 0.5 mile on about 1 day per month, and below 7 miles on less than 5 days per month. At sheltered locations like Hamilton Air Force Base, these figures are a little higher. Fog is infrequent but often a haze hangs over the bay and surrounds hills in various shapes, such as wreaths and domes. It is one time of the year that fog may be enjoyed.

Routes.–The routes for approaching San Francisco Bay are described in chapter 3 and at the beginning of this chapter under San Francisco Traffic Separation Scheme.

Taking care to pass clear of the separation zone centered on San Francisco Approach Lighted Horn Buoy SF, steer a course to enter the charted eastbound San Francisco Bay traffic lane. The recommended route for outbound vessels is via the charted westbound San Francisco Bay traffic lane to the precautionary area of the San Francisco Traffic Separation Scheme.

Supertankers and other vessels of very deep draft inbound and making for the deepwater anchorages N and S of the San Francisco-Oakland Bay Bridge should set a course from the Golden Gate Bridge to pass W and N of buoyed Harding Rock, thence E until N of Alcatraz Island, thence SE to the anchorages. Note that this route is in opposition to the Vessel Traffic Service Scheme established for San Francisco Bay between the Golden Gate Bridge and Alcatraz Island.

From the Golden Gate Bridge, vessels bound for San Pablo Bay and Carquinez Strait set a course to follow the charted Vessel Traffic Service to the precautionary area E of Alcatraz Island, thence N through the charted Vessel Traffic Service to San Pablo Bay and Carquinez Strait.

Pilotage.–Pilotage in and out of San Francisco is compulsory for all foreign vessels and U.S. vessels under register. The San Francisco Bar Pilots keep one of two vessels on station at all times, the SAN FRANCISCO or the CALIFORNIA. The pilot vessel cruises on station 24 hours a day near the San Francisco Approach Lighted Horn Buoy SF, or, in foul weather, seaward of it. If prior arrangements have not been made with the pilots association office on Bulkhead Pier 7, masters may give these signals upon approaching the San Francisco Approach Lighted Horn Buoy SF:

Clear visibility: by day, hoist code flag "G"; by night, four long flashes on the signal lamp. **Limited visibility**: four long blasts and lay to. The pilot boat on station may be contacted at any time on VHF-FM channels 10 (156.50 MHz) and 18 (156.90 MHz); the radio call is KMG-389.

The pilots board directly from the pilot boat. Pilot ladders should be rigged about 9 feet from the waterline and amidship of the vessel at all times. A light must be ready to illuminate the ladder if necessary. Contact pilot boat prior to arrival to determine on what side the ladder should be rigged. Man ropes are only used when the pilot departs the vessel.

The preferred anchorage for deep-draft vessels in the vicinity of the pilot station (San Francisco Approach Lighted Horn Buoy SF) is an area with a 1 mile radius centered in 37°49'N., 122°42'W.

River pilots are engaged by prior arrangement with the ship's agent.

Chart 18650.–San Francisco, one of America's great cities, occupies the N portion of the peninsula forming the S entrance to the bay. The 3-mile N shore of San Francisco from the Golden Gate Bridge to the main waterfront includes the **Presidio Military Reservation;** several yacht harbors; Government buildings and piers on Black Point; Aquatic Park; and Fisherman's Wharf. Shoals with depths less than 10 feet extend up to 0.2 mile from the shore.

An unmarked 700-yard-wide degaussing range is 1.9 miles E of the Golden Gate Bridge and 800 yards offshore. Vessels are cautioned not to foul the submarine cables that extend S from the range to the observation house on the marina seawall.

Alcatraz Island, 2.5 miles E of the Golden Gate Bridge, is one of the leading marks in entering San Francisco Bay. The small island is 148 feet high and has many buildings on it. Near the NW end of the island is a water tower, which is reported to be usually the only landmark visible when that area is in fog. **Alcatraz Light** (37°49.6'N., 122°25.3'W.), 214 feet above the water, is shown from a gray, octagonal pyramidal tower on the SE part of the island. Fog signals are on the extreme NW and SE ends of the island.

A **submarine operating area** is N of Alcatraz Island. (See 207.640 (a), chapter 2, for limits and regulations.)

A rock awash, marked on its W side by a bell buoy, is 125 yards W of the NW end of Alcatraz Island. The rocks and tide pools, which extend about 100 feet from the S tip of the island, are reported to cover at high water.

Alcatraz Island, a part of the Golden Gate National Recreation Area, is administered by the Department of Interior's National Park Service.

Federal regulations require that prior permission to land at Alcatraz, or to berth vessels at Fort Point, Fort Mason, Black Point, and Aquatic Park must be obtained from the General Superintendent, Golden Gate National Recreation Area, Fort Mason, San Francisco, Calif. 94123.

An authorized passenger ferry, which operates frequently, uses a dock on the SE side of the island. In December 1979, 28 feet was reported off the dock.

Yerba Buena Island, 345 feet high and 2.5 miles SE of Alcatraz Island, is of small extent, irregular in shape, and covered with a scrubby growth of trees. On its summit is a former lookout tower, now a Navy Officers Club, and the Coast Guard operated San Francisco Vessel Traffic Service Operation Center and radar antenna site. The piers and wharves in the small cove on the E side of the island are part of a Coast Guard Base where the offices of the Captain of the Port are located.

Treasure Island is a low filled area N of and connected by a causeway to Yerba Buena Island. Built originally for the San Francisco International Exposition of 1939-40, it is now a U.S. Naval Station. Some of the piers around the island have lights. A shoal covered 15 feet, is off the N end of the island.

When the prevailing W winds are blowing, deep-draft vessels proceeding to the berthing area on the E side of the island may have extreme difficulty making the 90° turn from the narrow channel between the 30-foot curves SE of Yerba Buena Island.

Naval restricted areas are off the N end of Treasure Island and between this island and Yerba Buena Island. (See 207.640 (h) and (i), chapter 2, for limits and regulations.)

The **San Francisco-Oakland Bay Bridge,** said to be the eighth longest bridge in the world, crosses the bay from **Rincon Point** in San Francisco to Yerba Buena Island, thence to Oakland. The recommended passage for southbound traffic is under the NE half of span A-B (midspan clearance 204 feet). Northbound traffic should use the SW half of span D-E (midspan clearance 204 feet). The midspan clearance of spans B-C and C-D are each 220 feet. These clearances are approximate; they may be reduced by several feet due to heavy traffic on the bridge and prolonged periods of extremely high temperature, and as much as 10 feet under extreme conditions.

The **Port of San Francisco,** the largest port on the bay, is the oldest and one of the most important on the Pacific coast. Though primarily a general cargo port, grain, bulk liquids, containers, newsprint, automobiles, bananas, copra, cotton, and other commodities are handled here. San Francisco is the home port of passenger liners of several U.S. companies in the transpacific service, and is a popular port of call for other passenger vessels on regular scheduled and special cruises.

Prominent features.–The skyline of the city of San Francisco is unmistakeable, with several dominant landmarks: the 980-foot television tower supporting three antennas, the pyramid-shaped

Transamerica Building, the Coit Tower on Telegraph Hill 3.4 miles E of the bay entrance, and the Bay Bridges with their freeway elevated approaches. Inside the bay, the Bank of America Building, the Union 76 Tower, the clock tower at the S end of the San Francisco-Oakland Bay Bridge, the old Ferry Building with its 240-foot clock tower on the waterfront S of Pier 1, and the U.S. Coast Guard Depot radar tower on Yerba Buena Island are prominent.

The **Ferry Building,** once the terminal of many ferry boats, now houses the **San Francisco Port Authority** offices, the offices of the Marine Exchange, Inc., the many offices and exhibits of the World Trade Center, and the San Francisco station for the Trans-Bay Tube of the Bay Area Rapid Transit (BART).

Channels.–Depths of 45 feet or more are available from the Golden Gate Bridge to most of the anchorages; depths ranging from 29 to 40 feet can be taken to most of the San Francisco piers.

Anchorages.–General, naval, and explosives anchorages are in San Francisco Bay. (See 110.1 and 110.224 (a) and (g), chapter 2, for limits and regulations.) The charted obstruction in Temporary General Anchorage 7, about 0.5 mile W of the Treasure Island cupola, is a wreck covered 68 feet and considered a potential hazard for fouling anchors. Two submarine pipeline areas cross San Francisco Bay within General Anchorage 9; one crosses between Oakland and Brisbane, and the other about 1.5 miles to the S. Mariners are cautioned not to anchor in these areas. (See chart 18651.)

Dangers.–**Anita Rock,** 1.1 miles E of Fort Point and 300 yards from shore, is covered 3 feet and marked by a light.

There are several rocky patches with depths of 33 to 35 feet W and NW of Alcatraz Island that must be avoided by deep-draft vessels. The northwesternmost of these shoals is **Harding Rock,** marked by a lighted buoy.

The Trans-Bay Tube of the Bay Area Rapid Transit District crosses San Francisco Bay from the vicinity of the Ferry Tower to Oakland. Mariners are **prohibited** from dropping or dragging anchors when in the vicinity of the tunnel crossing.

Heavy tide rips occur in the vicinity of Alcatraz Island.

Tides.–The mean range of tide at Golden Gate is 4.1 feet, and the diurnal range of tide is 5.8 feet. A range of about 9 feet may occur at the time of maximum tides. The lowest low water is about 2.5 feet below mean lower low water. Daily tide predictions for Golden Gate are given in the Tide Tables.

Currents.–Inside the Golden Gate the flood current sets into all parts of the bay and causes swirls from the Golden Gate as far E as Alcatraz and Angel Islands and through Raccoon Strait, N of Angel Island. The ebb current, inside the Golden Gate, is felt first along the S shore. In the Golden Gate, the average duration of the ebb stream is somewhat greater than that of the flood. The Sacramento and San Joaquin Rivers have weak flood currents during periods of freshets.

The San Francisco-Oakland Bridge has large current eddies near the foundation piers that cause ships to sheer off course.

Caution.–Oakland's Seventh Street Marine Terminal, about 1 mile E of Yerba Buena Island, forms a current lee on both the flood and the ebb current. Vessels making for Middle Harbor and Oakland Inner Harbor on a flood current will encounter a lee on the S side of the terminal; when the bow enters the slack water, the vessel will tend to sheer to the left. Similarly, vessels bound for the Outer Harbor on an ebb current will encounter slack water on the N side of the terminal, with a tendency to sheer to the right. This condition may be dangerous to deep-draft, loaded vessels, and should be anticipated.

The flow of tidal currents throughout San Francisco Bay is clearly depicted on the Tidal Current Charts, San Francisco Bay. The charts, which may be used for any year, are referred to the times of the maximum flood and ebb currents at San Francisco Bay entrance (Golden Gate). Daily predictions are given in the Tidal Current tables.

Weather.–San Francisco enjoys a marine-type climate characterized by mild and moderately wet winters and by dry, cool summers. Winter rains (December through March) account for about three-fourths of the average annual rainfall, and measurable precipitation occurs on an average of 10 days per month during this period. However, there are frequent dry periods lasting well over a week. Severe winter storms with gale winds and heavy rains occur only occasionally. Thunderstorms average two a year and may occur in any month, but are usually very mild.

The daily and annual range in temperature is small. A few frosty mornings occur during the winter, but the temperature seldom drops below freezing. Winter temperatures generally rise to the high fifties in the early afternoon.

The summer weather is dominated by a cool sea breeze resulting in an average summer wind speed of nearly 13 knots. Winds are light in the early morning, but normally reach 17 to 22 knots in the afternoon.

A sea fog, arriving over the station during the late evening or night as a low stratified cloud, is another persistent feature of the summer weather. This "high" fog, occasionally producing drizzle or mist, usually disappears during the late forenoon. Despite the morning overcast, summer days are remarkably sunny. On the average a total of only 15 days during the 4 months from June through September are classified as cloudy.

Daytime temperatures are held down both by the morning low overcast and the afternoon strengthening sea breeze, resulting in daily maximum readings averaging under 70°F. from May through August. However, during these months occasional "hot" spells lasting a few days are experienced without the usual "high" fog and sea breeze. September, when the sea breeze becomes less pronounced, is the warmest month with an average maximum of 72°F. Minimum temperatures during the summer are near 51°F.

A strong temperature inversion with its base usually at a height of 1,500 feet persists throughout the summer. Inversions close to the ground are infrequent in summer, but rather common in fall and winter. As a consequence of these factors and the continued population and economic growth of the area, atmospheric pollution has become a problem of increasing importance.

The National Weather Service maintains offices in Oakland, Redwood City, and at San Francisco International Airport; barometers may be compared there or by telephone. (See appendix for addresses.)

(See page T-3 for **San Francisco climatological table.**)

Towage.–Tugboats are available in sufficient quantity for the traffic in the greater harbor.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

San Francisco-Oakland is a **customs port of entry.**

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard.–The Twelfth Coast Guard District Headquarters and a **Marine Safety Office** are in San Francisco. (See appendix for addresses.) A Coast Guard Air Station is at San Francisco International Airport, and a Coast Guard Base is on the E side of Yerba Buena Island.

Harbor regulations.–The Port of San Francisco is under control of the city of San Francisco, and its management is vested in the San Francisco Port Commission, in direct charge of the port director of that body. The office of the **Chief Wharfinger** is in the Ferry Building.

The harbor regulations are prescribed by the San Francisco Port Authority and enforced by the Chief Wharfinger.

In addition to the harbor regulations prescribed by the San Francisco Port Authority, the Coast Guard Captain of the Port has prescribed the following supplemental regulations for vessels carrying explosives and certain hazardous bulk cargoes.

Vessels entering or leaving San Francisco Bay laden with explosives, (Class A or military), having a net explosive weight in excess of 100 net tons will be escorted by a Coast Guard patrol craft while underway within the bay complex. Transits of explosive laden vessels within the bay complex are limited to daylight hours. Nighttime movements may be made only when authorized by the Captain of the Port and only if an emergency or unusual situation exists. Speed of transit shall not exceed 12 knots. No transits will be made when the visibility is reduced to less than 1 mile.

Cargoes of a particular hazard as listed in 33 CFR 161.3, chapter 2, when carried in bulk, present certain risks over and above other bulk cargoes. In recognition of these risks, it is the desire of the Captain of the Port, San Francisco, that agents and masters of vessels carrying these cargoes in bulk plan their operations to include the following:

(a) The Coast Guard will provide an escort for vessels carrying these cargoes within the San Francisco Bay complex and such vessels should not move until the escort vessel arrives. Short movements between nearby piers should be coordinated with Captain of the Port, San Francisco, who will advise whether an escort will be required;

(b) Speed of transit shall not exceed 12 knots;

(c) Visibility requirements for transit should equal or exceed 1 mile;

(d) Movements of those vessels carrying cargoes of particular hazard which under ambient temperatures are a gas and either poison or flammable, will be limited to daylight hours only unless otherwise authorized by the Captain of the Port.

Wharves.–The general cargo and specialized terminals of the Port of San Francisco are on the bay and on Islais Creek and Channel Street; the facilities on the latter waterways are included in the description of these waterways. All of the piers described are owned by the San Francisco Port Authority and leased to private concerns. Only the major piers are described. The alongside depths given for each facility described are reported depths. (For information on the latest depths, contact the Port of San Francisco.) The deck height of each pier is 12 feet unless otherwise stated.

The port has 30 active deepwater piers, 29 of which have 74 berths used primarily for general cargo. Several of the other piers are used for the receipt of oil and fish, ship repairs, mooring various types of small vessels, and for other purposes. Four other piers, actually wharves, are used mostly as special-purpose terminals and can accommodate five vessels.

All of the piers have rail trackage on the aprons and one or more transit sheds. Most of the port's inbound and outbound cargo moves to and from the piers by truck. The Embarcadero, a four-lane thoroughfare, provides access to most of the piers; truck connections to piers S of Pier 46A are via other marginal and arterial streets. The arterials connect with the city's extensive freeway system.

Cargo at the port is handled mostly by ship's tackle, but hoisting and heavy lift equipment is available in the port. Most piers have electrical shore power and water connections.

The port operates its own beltline railroad, which connects to three major railroads; five ferry slips are maintained by the port for the transfer of railroad cars to and from other ports in the bay. Bonded warehouses, cold storage facilities, extermination and fumigation services, marine and cargo surveying services, and other maritime services are available in San Francisco. For a complete description of the port facilities refer to Port Series No. 30, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Piers N of Ferry Building (37°47.7'N., 122°23.5'W.):

Pier 9: S side 800 feet, face 154 feet, N side 800 feet; 35 feet alongside; transit shed 820 feet by 1,112 feet; various tug operators.

Piers 15 and 17: S side 800 feet, face 485 feet, N side 800 feet; 35 feet alongside; three berths. The two piers are connected by a transit shed 135 feet by 140 feet and by a depressed center area of 79,500 square feet; transit shed 820 feet by 167 feet, shed 780 feet by 143 feet; importing newsprint; operated by Star Terminal Co.

Pier 19: S side 638 feet, face 153 feet, N side 800 feet; 35 feet alongside; 2 berths; transit shed 633 feet by 113 feet; ship berthing for general cargo. (A special purpose foreign-trade subzone for the port of San Francisco is at pier 19.)

Pier 23: S side 810 feet, face 160 feet; N side, 638 feet; 35 feet alongside; two berths; transit shed 714 feet by 113 feet; ship berthing for general cargo. (Piers 19 and 23 are integrated piers connected by a bulkhead and wharf with 260,000 square feet of covered space.)

Pier 27: E side, 1,359 feet, face 206 feet; 35 feet alongside; transit sheds 1,270 by 175 feet, 370 by 141 feet, and 400 by 185 feet; ship berthing for general cargo.

Pier 31: E side 582 feet, face 150 feet, W side 638 feet; 35 feet alongside; two berths; transit shed 800 feet by 110 feet; general cargo; various operators.

Pier 33: E side 687 feet, face 150 feet, W side 787 feet; 35 feet alongside; two berths; transit shed 800 feet by 110 feet.

Pier 35: E side 1,053 feet, face 200 feet; W side 802 feet; 35 feet alongside, two berths; transit shed 990 feet by 162 feet; passengers; operated by California Stevedore and Ballast Co.

Pier 45: E side 1,314 feet, face 140 feet; 35 feet alongside; three berths; three transit sheds; 186,000 square feet covered storage.

Piers S of Ferry Building:

Pier 26: S side 620 feet, 35 feet alongside; face 200 feet, 50 feet alongside; N side 635 feet, 35 feet alongside; two berths; transit shed 750 feet by 160 feet; general cargo; operated by various operators.

Pier 28: S side 680 feet, face 150 feet, N side 541 feet; 35 feet alongside; two berths, used as ship repair facility.

Piers 30 and 32: S side 932 feet, 35 feet alongside; face 622 feet, 40 feet alongside; N side 845 feet, 35 feet alongside; three berths; two transit sheds, total cargo floor area 244,000 square feet; general cargo, containers, and passengers; operated by Crescent Wharf and Warehouse Co. Piers are connected by a covered bulkhead transit shed of 30,000 square feet and by an open depressed center area of 95,000 square feet.

Pier 48: N side 610 feet, face 369 feet, S side 636 feet; 35 feet alongside; 121,000 square feet covered storage; newsprint; operated by Crown Zellerbach Corp.

Pier 50 (Mission Rock Terminal): S side 1,100 and 575 feet; face 1,000 feet, N side 1,480 feet; 35 feet alongside; six berths; 4 transit sheds, total covered area 231,000 square feet; general cargo and containers; operated by Crescent Wharf and Warehouse Co.

Pier 70: 0.6 mile S Pier 50: E side 1,300 feet, face 80 feet, W side 1,180 feet; 35 feet alongside; cranes up to 250-ton capacity; receipt and shipment of automobiles; about 13 acres of open storage; operated by Fred F. Noonan Co., Inc.

Pier 80 (Army Street Terminal): S side 2,657 feet, face 1,296 feet, N side 1,138 feet; 40 feet alongside; nine berths four transit sheds, total cargo floor area 68.5 acres; container cranes on a track running the full length of the S apron and container storage area; terminal office building, medical clinic, storage building, pneumatic message tube system; general and container cargo; operated by States Steamship Co., and California Stevedore and Ballast Co.

China Basin, 1.1 miles S of the Ferry Building, is the entrance to **Channel Street,** a canal extending 0.5 mile SW from the basin. Piers 46A and 46B are on the N side of the basin just below the first bridge.

The controlling depth to Pier 46B is about 22 feet. Channel Street above the second bridge is used only for mooring fishing boats. The bascule bridges across the canal have a least clearance of 1 foot. (See 117.1b, 117.710 and 117.712(f), chapter 2, for drawbridge regulations and opening signals.)

Caution.–A commercial heliport is at the shoreward end of Pier 46A, on the N side of China Basin. A flight path about 500 feet wide for approaching and departing helicopters extends 4,000 feet on a bearing of 120°. The minimum altitude along the flight path is 15 feet at the S edge of the pier. Vessels moored on the S side of the pier and transiting China Basin should exercise caution to prevent any appurtenances from penetrating the flight path.

Islais Creek is entered 2.9 miles S of the Ferry Building. A dredged approach area with a project depth of 35 feet is off the entrance. A highway bascule bridge with a clearance of 4 feet crosses the creek about 0.6 mile above the entrance. (See 117.1b, 117.710 and 117.712(f), chapter 2, for drawbridge regulations and opening signals.)

The wharves described in Islais Creek are owned by the San Francisco Port Authority and leased to private concerns. The alongside depths given for each facility described are reported depths. (Contact the Port of San Francisco for latest depths.)

Pier 80 (Army Street Terminal), on the N side of the entrance: described earlier under wharves for the Port of San Francisco.

Pier 90 (Port of San Francisco Grain Terminal), on the S side of the creek about 0.4 mile above the entrance: 1,210 feet of berthing space with depths of about 35-40 feet alongside; deck height, 12 feet; receipt of automobiles; grain elevator with storage capacity of 2 million bushels; six automated loading spouts, capacity up to 1,500 tons per hour; 250,000 square feet of cargo space; operated by Stockton Elevators, and ABC Automotive Co.

Pier 92, just E of Pier 90: 868 feet long with depths of about 35 feet alongside; deck height, 12 feet; water is available; storage tanks with a capacity of over 2 million gallons; transit shed with over 37,000 square feet of storage space, 7½ acres of open storage for automobiles; receipt of automobiles, and receipt and shipment of bulk animal and vegetable oils; operated by ABC Automotive Co., and Baker Commodities.

Pier 84 (Copra Terminal), on the N side and near the head of the creek: 575 feet long, including dolphins, with depths of about 32 feet alongside; deck height, 10 feet; water is available; four portable pneumatic unloaders for copra, total capacity 160 tons per hour; copra processing plant, and a 12,000-ton capacity warehouse for loose copra; bulk copra and petroleum products; operated by Cargill Co.

Piers 94–96, between Islais Creek and India Basin; face 2,456 feet; depths alongside 40 feet; 11½ acres open storage; cranes up to 40 tons; receipt and shipment of container cargo; operated by Crescent Wharf and Warehouse Co.

LASH Terminal (S side of Pier 96), N side of India Basin; face 1,500 feet; depth alongside 14 feet; 105,600 square feet covered storage; receipt and shipment of general cargo; operated by Crescent Wharf and Warehouse Co.

Foreign-Trade Zone No. 3 and Subzone 3-A are in San Francisco. (See chapter 1, Foreign-Trade Zones, and appendix for address.)

Supplies.–Fuel oils, gasoline, and all other marine supplies and services may be had in any desired quantity. Fuel oil is usually delivered by barge. Water can be obtained on the piers or by barge.

Repairs.–San Francisco, Oakland, Richmond, and Alameda have facilities for making repairs to vessels and machinery of all kinds and sizes. The largest commercial floating drydock in San Francisco has a length of 900 feet, width of 148 feet, and a lifting capacity of 65,000 tons. The largest graving dock, at Point Potrero just S of Richmond, has a 748-foot length, width of 84 feet, and can handle drafts up to 30 feet. There are several smaller drydocks on the San Francisco side, and several marine railways and floating docks on the Oakland side.

Communications.–San Francisco is the terminus of several transpacific steamship lines and the port of call for numerous lines of foreign, coastal, and intercoastal vessels. It is served directly by a major highway and is connected by the Bay Bridge to several others. The city is served by three transcontinental railroads; connections to two of the railroads are by barge, while one has tracks extending S and E around the S bay. San Francisco International Airport is on the W shore of the bay about 5 miles S of the city; it is served by many airlines.

The **Marine Exchange** of the San Francisco Bay region reports and records all Golden Gate ship arrivals and departures and conducts communications to serve the bay area commercial traffic. The station can be called 24 hours a day for relay of messages and other marine related services on VHF-FM channels 10 (156.50 MHz) and 18 (156.90 MHz). The station also monitors channels 13 (156.65 MHz) and 16 (156.80 MHz). The ship spotting station is located at the outer end of Pier 45.

Small-craft facilities.–San Francisco Municipal Yacht Harbor, 1.8 miles E of the Golden Gate Bridge with a W and E basin about 0.3 mile apart, has depths of 8 to 12 feet to the berths. A light near the end of a point marks the N side of the entrance to W basin; a prominent stone tower is 0.2 mile W of the light. The E basin is protected on the N by a breakwater extending E from the W shore and by a short detached breakwater, and on the E by a pier of **Fort Mason,** U.S. Army. The seaward end of the longer breakwater is marked by a light. E basin may be entered from either end of the detached breakwater. The harbor accommodates about 700 boats in the W and E basins. Guest berths are available; transients should report to the harbormaster's office on the S side of the W basin for berth assignment.

Aquatic Park, 2.6 miles E of the Golden Gate Bridge, is a recreation area protected on the W by a curved pier extending out from Black Point and on the E by a pier that berths historic ships of the National Maritime Museum. The basin is closed to power vessels, and other vessels must stay offshore away from buoys marking a swimming area. The **speed limit** is 3 knots. Depths of 9 to 16 feet are inside the basin. Small craft can find anchorage in about 13 feet. Permission to anchor for more than 24 hours must be obtained from the Aquatic Park Ranger Station.

Fisherman's Wharf is 2.8 miles E of the Golden Gate Bridge. Depths of 15 feet or more are available to the wharves. Gasoline, diesel fuel, water, ice, and marine supplies are available.

Pier 39 Marina, 0.3 mile E of Fisherman's Wharf, is a boat harbor reported to have 350 berths and 21 transient berths for boats up to 60 feet long. In 1978, depths in the slips ranged from 13 to 34 feet. The W side of the harbor is protected by an L-shaped breakwater which is marked by a buoy off the NE end. The N and E sides of the harbor are protected by detached breakwaters which are marked by lights. The harbor can be entered through the channel between the L-shaped breakwater and the northern detached breakwater or the channel between the two detached breakwaters. Electricity, water, ice, and pump-out facilities are available at the marina.

Central Basin, 1.9 miles S of the Ferry Building, has depths of 10 to 24 feet. Two small marinas with limited berthing facilities are on the W shore of the basin. Gasoline, water, covered and open storage, and some small-boat supplies are available. There are a surfaced boat ramp and a portable lift; hull and engine repairs can be made. Hull repairs can also be made at a boatbuilding and maintenance school in the SW corner of the basin.

On the N side of **Hunters Point,** 3.8 miles S of the Ferry Building, are two repair facilities. The largest marine railway can handle craft up to 350 tons or 140 feet for hull and engine repairs.

Charts 18651, 18652.–S of San Francisco, **Point**

Avisadero, which is the E extremity of Hunters Point, **Sierra Point,** Oyster Point, **Point San Bruno,** and Coyote Point, all on the W shore of the bay, are prominent natural features. The San Francisco Naval Shipyard is at Hunters Point, where a **Naval restricted area** is offshore. (See 207.640 (c), chapter 2, for limits and regulations.) The Bayshore Freeway extends S on a filled area from the vicinity of **Candlestick Point,** and cuts back inland at Sierra Point. **Oyster Point Channel,** marked by private lights and daybeacons, has depths of about 5 feet and leads to a small basin. A steel company has wharves and sheds on the W side of the basin, and a barge repair yard is on the S side.

Oyster Point, a low filled area, is the site of a small-boat harbor accommodating about 570 boats. Depths of about 6 feet are in the harbor. The entrance channels E and NE of the harbor are marked by private lights. In 1976, the E entrance channel had a reported controlling depth of 4 feet. Transients should report to the harbormaster's office for berth assignment. A prominent sculptured tower is on the hill 0.7 mile S of Oyster Point; the tower is floodlighted.

The area between Point San Bruno and Coyote Point is occupied by **San Francisco International Airport,** A **seaplane restricted area** extends offshore from the airport. (See 207.640(d), chapter 2, for limits and regulations.)

Coyote Point is covered by a heavy growth of trees and is raised as an island. It is the most prominent point on the S bay. A small-craft harbor accommodating about 475 boats is on the E side of the point. The entrance channel, marked by a private lighted range and two private lights, had a controlling depth of 3 feet in April 1976. The harbor, operated by San Mateo County, is composed of two basins having depths of about 8 feet. Transients should report to the harbormaster's office on the NW side of the harbor for berth assignment; guest berths are usually available. A harbor patrol boat is maintained.

(See the small-craft facilities tabulation on chart 18652 for services and supplies available at the small-craft facilities at Oyster Point and Coyote Point.)

The **San Mateo-Hayward Bridge** crossing the lower part of San Francisco Bay near **San Mateo** has a fixed span with a clearance of 135 feet over the main channel. An overhead power cable with a clearance of 160 feet over the main channel crosses the bay just S of the bridge.

A section of the old San Mateo lift bridge, now used as a fishing pier, extends 4,135 feet from the San Mateo shore just S of the new bridge. A part of the fishing pier extends into the W part of the main channel. A private light, 12 feet above the water, marks the SE leg of a transmission line tower close E of the seaward end of the fishing pier.

Redwood Creek, 4 miles SE of San Mateo Bridge, is entered through a marked channel that leads to the municipal wharves at the **Port of Redwood City,** 2.5 miles above the mouth. Turning basins are to the N and S of the wharves. Federal project depths are 30 feet in the channel and basins. (See Notice to Mariners and latest editions of charts for controlling depths.)

Traffic in the waterway is in petroleum products, bulk cement, gypsum rock, salt, scrap metal, and lumber. Overhead power cables across the waterway have a clearance of 155 feet. A prominent cement plant, inactive in 1973, is at the junction with **Westpoint Slough,** just N of the port.

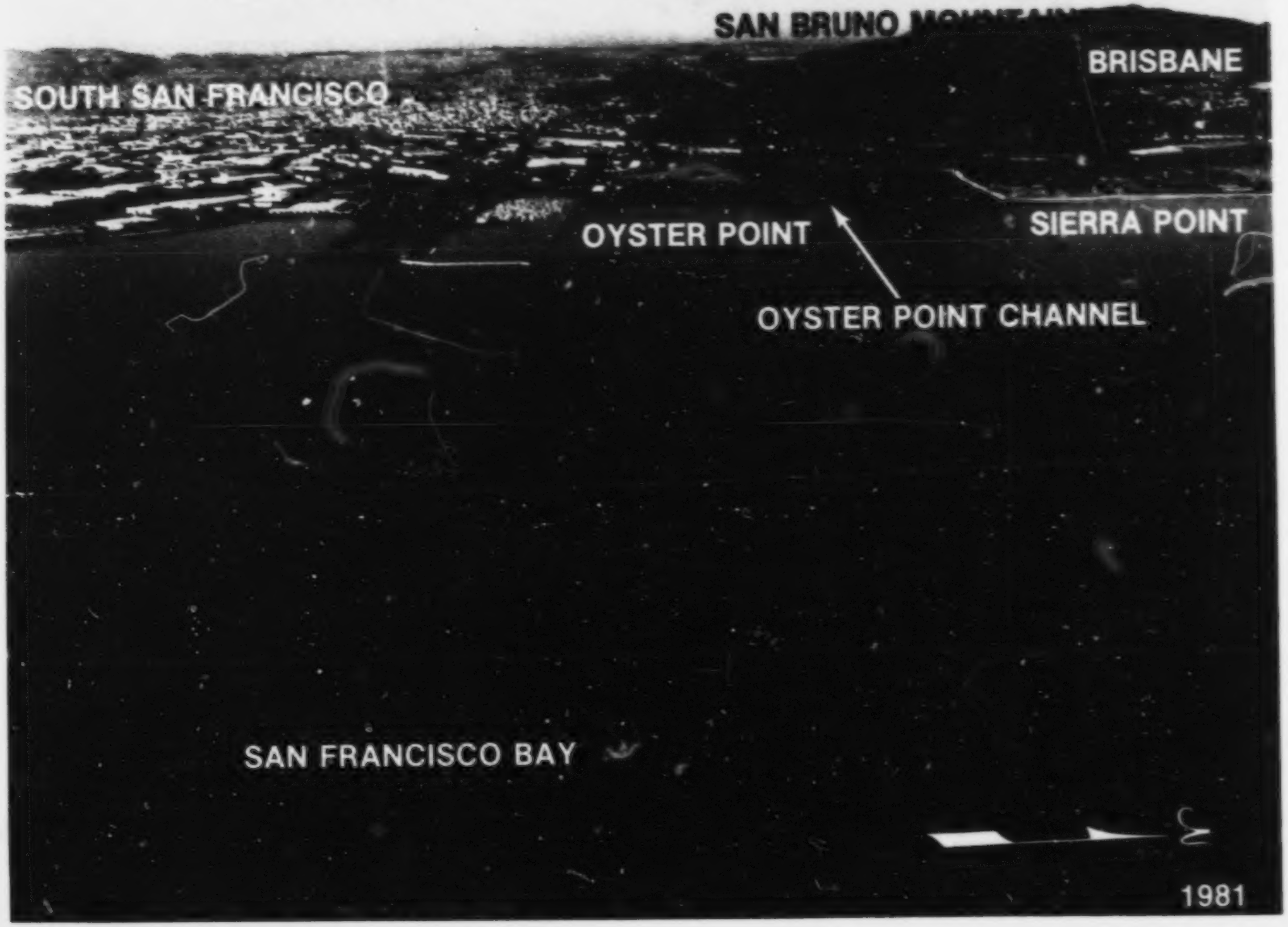
Wharves.–The Port of Redwood City operates three deepwater municipal wharves. Deck heights are 15 feet. Berths 1 and 2 (37°30′48″N., 122°12′32″W.) have a combined 855-foot face with 36 feet reported alongside. Two nearby transit sheds have a total of 65,000 square feet of storage space available. Berth 3 (just S of Berths 1 and 2), 450 feet long, has a reported depth of 36 feet alongside. A moveable hopper for unloading gypsum rock and a conveyor for handling lumber are at this wharf. Berths 1, 2, and 3 are served by railroad spurs. Berth 5 (about 0.4 mile S of Berths 1 and 2), is 500 feet long, and has a reported depth of 36 feet alongside; it is used for handling petroleum products. Electrical shore power and water connections are available at all wharves.

A barge wharf of the inactive cement plant is about 0.2 mile N of the N municipal wharf. A bulk salt handling wharf (37°30′17″N., 122°12′51″W.), S of the municipal wharves, is 620 feet long with dolphins and 33 feet reported alongside. For a complete description of the port facilities refer to Port Series No. 30, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Redwood City is 2 miles S of the port facilities. Redwood City Municipal Marina, just S of the port, can accommodate about 225 small craft. Other small-craft facilities are S of the Municipal Marina. (See the small-craft facilities tabulation of chart 18652 for services and supplies available.)

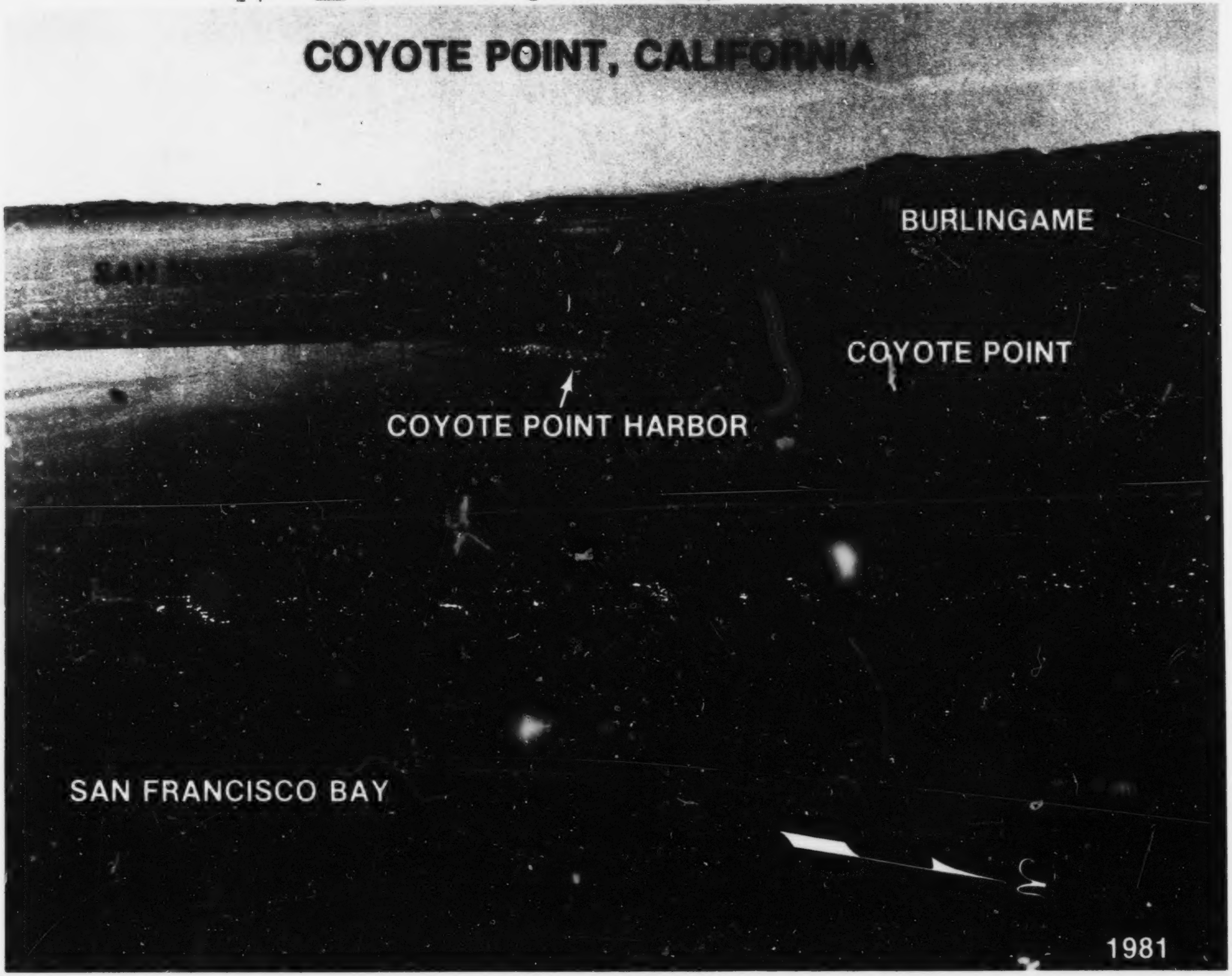
Ravenswood Point and **Dumbarton Point** are at the head of the bay and the mouth of Coyote Creek. Three bridges and an aqueduct cross the bay at this point. A fixed highway bridge, northernmost of the three bridges, has a clearance of 85 feet. The **Dumbarton Highway Bridge,** immediately SE of the fixed highway bridge, has a lift span with a clearance of 9 feet down and 135 feet up; the power cable about 150 yards NW has a clearance of 165 feet. A private fog signal is on the W pier of the lift bridge. About 1,100 yards SE of the bridge, an aqueduct, used to supply the city of San Francisco with water, crosses the bay. On the W shore, the aqueduct is carried on a trestle to a concrete building (charted) where it tunnels the channel to the E shore. The **Dumbarton Railroad Bridge,** just S, has a swing span with a clearance of 13 feet. A private fog signal is on the bridgekeeper's house. Dumbarton Highway Bridge is equipped with VHF-FM channels 9 (156.45 MHz), 13 (156.65 MHz), working frequency, and 16 (156.80 MHz). Dumbarton Railroad Bridge is equipped with VHF-FM channels 9 (156.45 MHz),

OYSTER POINT CHANNEL, CALIFORNIA


SAN BRUNO MOUNTAIN
BRISBANE
SOUTH SAN FRANCISCO
OYSTER POINT
SIERRA POINT
OYSTER POINT CHANNEL
SAN FRANCISCO BAY
1981

BEST DOCUMENT AVAILABLE

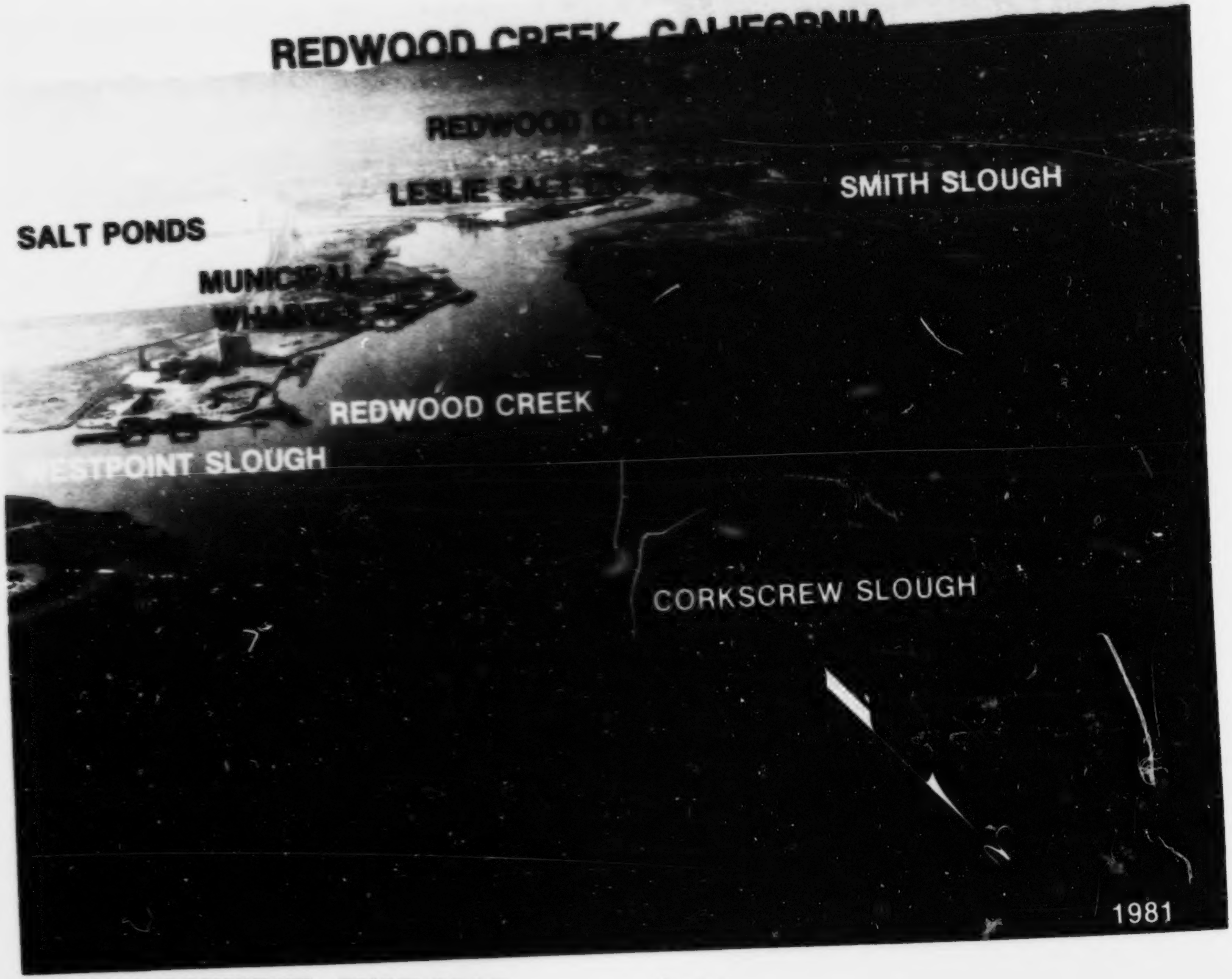
189



COYOTE POINT, CALIFORNIA

BURLINGAME
COYOTE POINT
COYOTE POINT HARBOR
SAN FRANCISCO BAY

1981


REDWOOD CREEK, CALIFORNIA
REDWOOD CITY
LESLIE SALT CO.
SMITH SLOUGH
SALT PONDS
MUNICIPAL
WHARVES
REDWOOD CREEK
WESTPOINT SLOUGH
CORKSCREW SLOUGH
1981

working frequency, and 16 (156.80 MHz). Call signs: KDO-749, Dumbarton Highway Bridge; KQ-7191, Dumbarton Railroad Bridge. (See 117.1b and 117.710, chapter 2, for drawbridge regulations and opening signals.)

Coyote Creek has many tributary sloughs. The main channel is marked as far as **Calaveras Point,** about 4 miles above the railroad bridge at Dumbarton Point. The power cables, 1.3 miles above Calaveras Point, have a clearance of 65 feet.

A narrow channel extends from the railroad bridge through **Mayfield Slough** on the E side of Palo Alto Municipal Airport to a yacht harbor about 2.8 miles above the mouth. In 1980, the channel bared at low water and dredging was planned. The channel is privately marked by a light and daybeacons. An overhead power cable crossing the slough has a clearance of 125 feet.

A channel, marked by a light and buoys, leads for about 3 miles through **Guadalupe Slough.** The channel is used by barges to deliver aviation fuel to a nearby airfield. An overhead power cable with a clearance of 65 feet crosses the slough about 1 mile above the entrance.

A dredged channel with its entrance in 37°40'18"N., 122°13'17"W., leads to a small-craft harbor operated by the city of San Leandro just S of the Oakland International Airport. In February-March 1981, the controlling depths were 4½ feet at midchannel in the entrance channel, thence 4 feet in the N basin, thence 5 feet in the channel to the S basin, thence in 1973, 4 feet in the S basin. The channel is marked by a **046°30'** lighted range, daybeacons and two lights at the entrance, the northernmost of which has a fog signal.

The harbor accommodates about 400 small craft; 15 guest slips are maintained. The harbormaster's office is on the SW side of the basin. A high-speed patrol boat is maintained. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18650, 18652.–Alameda is on an island separated from the mainland by **San Leandro Bay** on the E, and Oakland Inner Harbor and Tidal Canal on the N.

Encinal Basin, on the Alameda side of the Oakland Inner Harbor opposite Government Island, has facilities which are owned and operated by the Crescent Wharf and Warehouse Co. Depths in the basin are about 30 feet.

Encinal Terminal Berths 1, 2, and 3, and E side of basin: 584-foot berthing space; 35 feet alongside; deck height, 14½ feet; receipt and shipment of steel and general cargo.

Encinal Terminal Berth 5, on W side of basin opposite Berth 1: 740-foot berthing space; 35 feet alongside; deck height, 14½ feet; 192,000 square feet of covered storage; receipt and shipment of automobiles and containerized cargo.

Encinal Terminal Berth 4, parallel to the channel, on face of wharf, immediately N of Berth 3: 514-foot berthing space, 35 feet alongside; deck height, 14½ feet; one 115-ton crane.

Fortmann Basin, on the Alameda side of the Inner Harbor, just SE of the Encinal Basin has facilities operated by Fore Terminals, Inc. Berth 6, on the E side of the basin: 1,225-foot berthing space; 24 feet alongside; receipt and shipment of tallow, cocoanut and palm oil; one 30-ton mobile gantry crane.

Alameda Naval Air Station is on a filled area just W of the city and S of Oakland Inner Harbor.

Repairs.–Alameda has shipbuilding and repair yards with marine ways and floating drydocks. The largest drydock has a length of 873 feet, width of 140 feet, 31 feet on the blocks, and a lifting capacity of 40,000 tons.

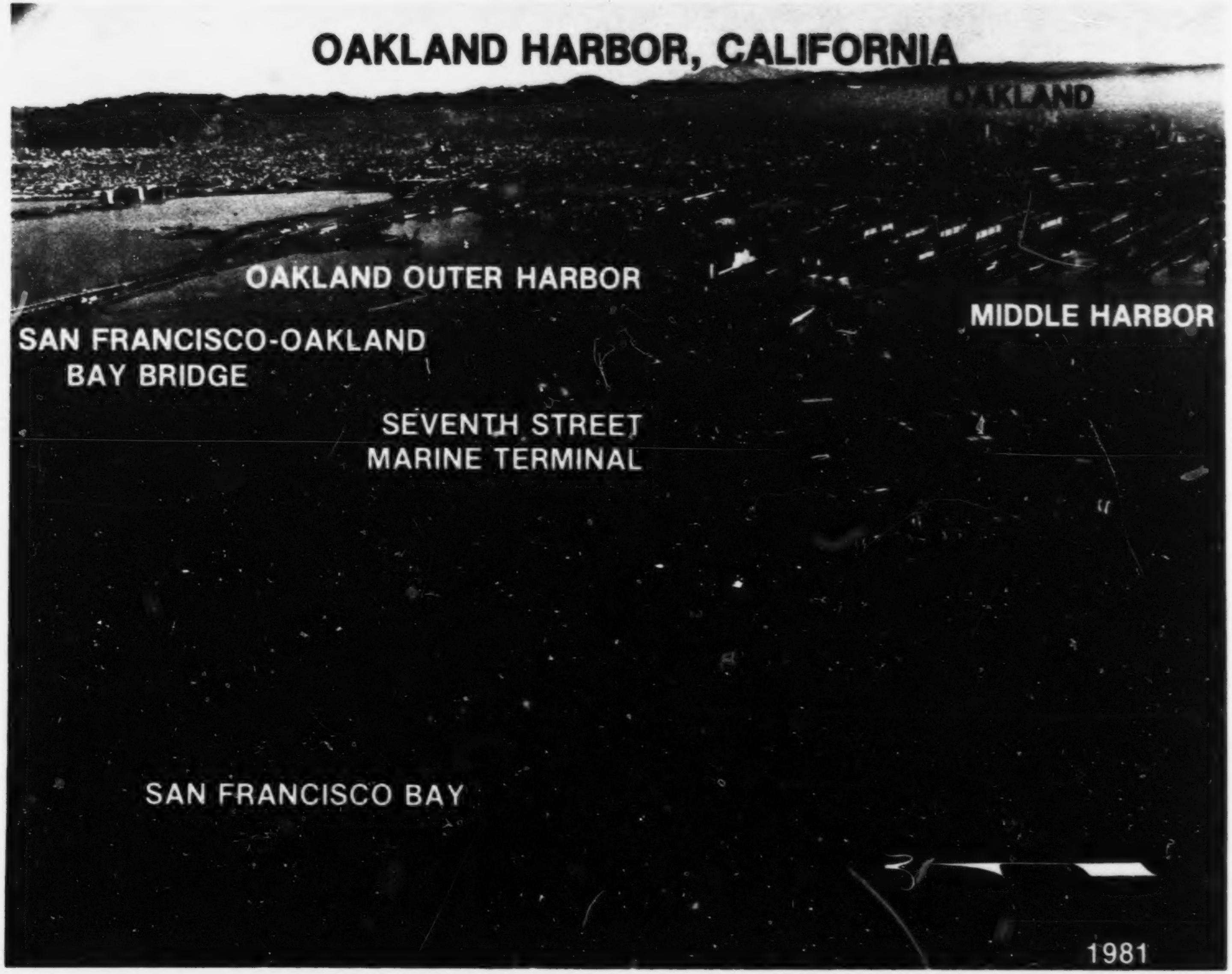
Ballena Bay Yacht Harbor, a large small-craft harbor, is on the E side of an island along the S shore of Alameda. This harbor offers safe refuge in storms. In March 1978, the controlling depth in the approach to the harbor was reported to be 5 feet; depths of 7 to 9 feet were reported alongside the berths. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.) A depth of 9 to 10 feet is available in the channel between the island and Alameda. A fixed bridge, with a clearance of 5 feet, crosses the channel about midway along the N shore of the island.

Oakland, on the E or mainland shore opposite San Francisco, is the second largest city on San Francisco Bay. It is the main-line terminus of the transcontinental railroads entering the San Francisco Bay area.

The **Port of Oakland** is entirely distinct from the Port of San Francisco; it is a separate customs **port of entry.** The Port of Oakland is the largest general cargo port on the bay, and a leading container-ship terminal on the Pacific coast.

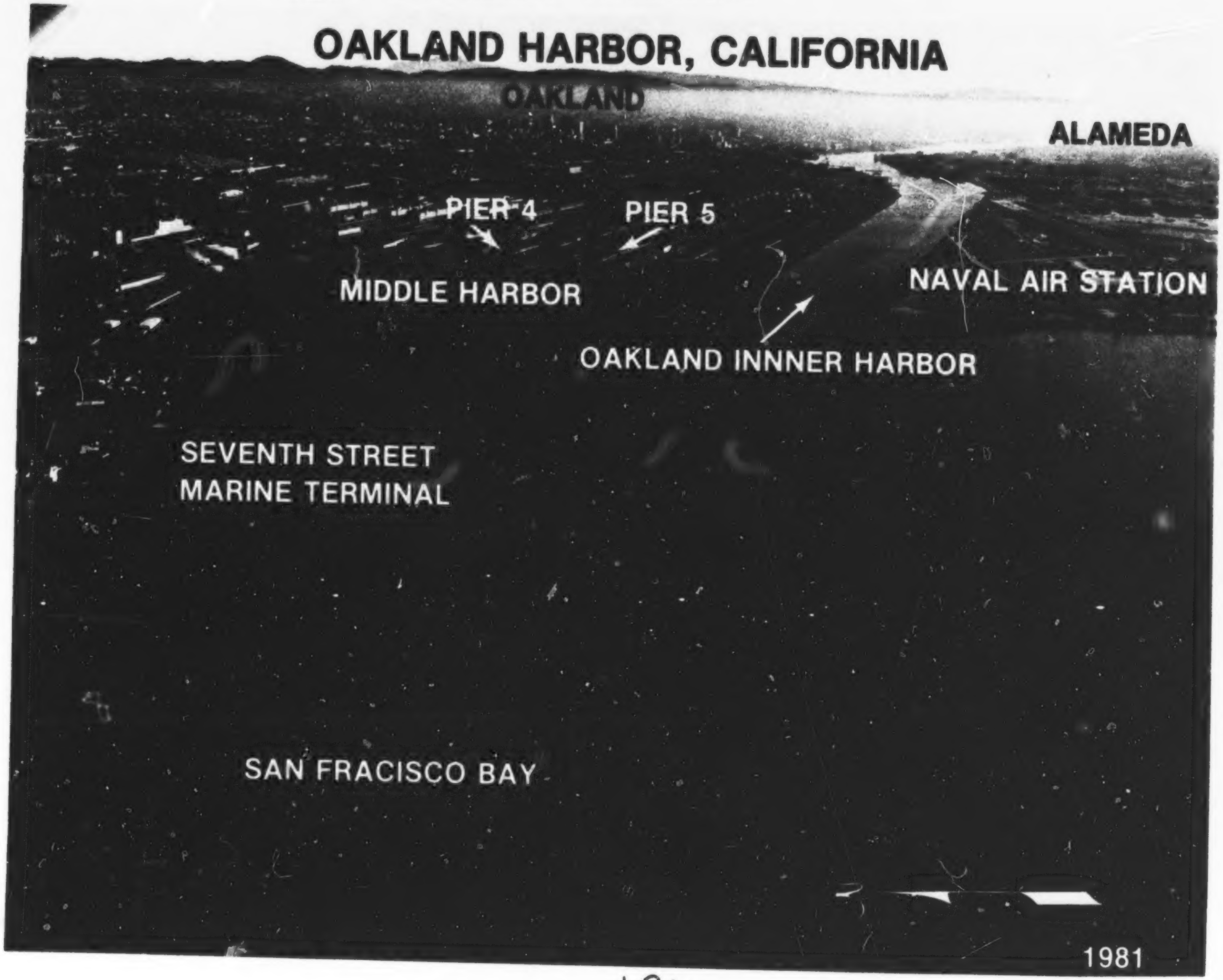
The Port of Oakland encompasses three areas: Outer, Middle, and Inner Harbors. **Oakland Outer Harbor** is between the Seventh Street Marine Terminal on the S and the San Francisco-Oakland Bay Bridge approach on the N. A **restricted area** is in the N end of Oakland Outer Harbor adjacent to the Oakland Army Base. (See 207.640 (g-2) and (g-3), chapter 2, for limits and regulations.) **Middle Harbor** is bordered by the Seventh Street Marine Terminal on the W and the facilities of the Navy Supply Center on the E. In 1969, the controlling depth to the piers of the Naval Supply Center was about 31 feet. The latest controlling depths may be obtained from the Naval Port Services Office, San Francisco. (See 207.640 (g-1), chapter 2, for regulations governing navigation in that part of Middle Harbor controlled by the Navy.)

Oakland Inner Harbor is that part of Inner Harbor Channel extending E from San Francisco Bay to **Tidal Canal.** It is adjacent to the most highly developed section of the city, bordering Oakland to the N and Alameda to the S. At the E end of the harbor, the artificial Tidal Canal leads to San Leandro Bay where a channel continues to the Metropolitan Oakland International Airport. Mariners should exercise caution when transiting Oakland Inner Harbor to prevent wake damage to boats moored at marinas along the waterway.


OAKLAND HARBOR, CALIFORNIA
OAKLAND
OAKLAND OUTER HARBOR
MIDDLE HARBOR
SAN FRANCISCO-OAKLAND BAY BRIDGE
SEVENTH STREET MARINE TERMINAL
SAN FRANCISCO BAY
1981

193 **BEST DOCUMENT AVAILABLE**

OAKLAND HARBOR, CALIFORNIA


OAKLAND
ALAMEDA
PIER 4
PIER 5
MIDDLE HARBOR
NAVAL AIR STATION
OAKLAND INNNER HARBOR
SEVENTH STREET
MARINE TERMINAL
SAN FRACISCO BAY

1981

194

A **105°32′–285°32′ measured nautical mile** has been established in the Inner Harbor just inside the entrance channel. The E and W points on the S side of the channel are each marked by two red targets on a pole and the E and W points on the N side of the channel are each marked by a single red target on a pole.

A **restricted area** is in Oakland Inner Harbor from the entrance to the E boundary of the Naval Air Station. (See 207.640 (f) and (g), chapter 2, for limits and regulations.)

Channels.–A Federal project provides for channel depths as follows: Bar Channel to and including Oakland Outer Harbor, 35 feet; Oakland Inner Harbor Channel to the end of Brooklyn Basin South Channel, 35 feet, thence 30 feet to Tidal Canal. (See Notice to Mariners and latest editions of charts for controlling depths.)

Brooklyn Basin North Channel had a midchannel controlling depth of 9 feet in 1966–1976. In 1963, the midchannel controlling depth through Tidal Canal was 13 feet. In 1974, shoaling to 1 foot was reported in the channel through San Leandro Bay leading to the airport.

For information as to conditions of the channel to Alameda Naval Air Station, mariners are advised to consult the Naval Port Services Office, San Francisco.

Bridges.–The fixed highway bridge across Brooklyn Basin at the E end of Government Island has a 27-foot width and a clearance of 11 feet. The three highway drawbridges across Tidal Canal have a least clearance of 15 feet. The vertical lift railroad bridge across Tidal Canal has a clearance of 13 feet down and 135 feet up. (See 117.1b, 117.710 and 117.712 (d), chapter 2, for drawbridge regulations and opening signals.)

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Harbor regulations.–The Port of Oakland is under the jurisdiction of the Board of Port Commissioners of the city of Oakland, and is managed by an executive director. The port's general offices are at 66 Jack London Square, Oakland, Calif.

Wharves.–The Port of Oakland owns and leases 10 major marine terminals, which have a total of 28 deep-draft berths. The port has over 400 acres of container facilities with 15 full container-ship berths, and 45 acres of general cargo/special commodity facilities. All of the major terminals have railroad trackage that connects to four major railroads and truck connections to the city's freeway system.

The port also has a number of smaller piers and wharves that are used for mooring small vessels, repair work, and for other purposes. There are several privately owned general cargo piers in the Inner Harbor. Most major deep-draft facilities are described. The alongside depths given for each facility described are reported depths. (For information on the latest depths contact the Port of Oakland or the facility operator.)

General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility.

For a complete description of the port facilities, refer to Port Series No. 31, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Facilities in Outer Harbor:

Oakland Army Base Piers 6, 6½, and 7 (37°49′17″N., 122°18′46″W.): 3,630 feet long; 31 feet alongside; deck height, 14½ feet; 352,500 square feet covered storage area; receipt and shipment of automobiles and general cargo; owned by U.S. Army and leased by Port of Oakland; operated by Maritime Services International, and Crescent Wharf and Warehouse Co.

Berth 10 (37°49′13″N., 122°18′26″W.): 839 feet long; 35 feet alongside; deck height, 14 feet; 10 acres of wharf and backup area; one 200-ton truck-mounted mobile crane, forklifts up to 4 tons; receipt and shipment of general cargo; operated by Crescent Wharf and Warehouse Company.

Sea-Land Terminal, Berths 8 and 9; immediately SW of Berth 10; 1,355 feet long; 40 feet alongside; deck height, 14 feet; 50 acres of open, container storage; container cranes up to 30 tons; water available; used for receipt and shipment of containerized cargo; operated by Sea-Land Service, Inc.

Berths 6 and 5 (37°49′04″N., 122°18′51″W.): 1,564 feet long; 35 feet alongside; deck height, 14½ feet; 15.6 acres of containerized cargo storage; 60,000 square feet covered storage area; 250-ton mobile crane, one 30-ton mobile gantry crane, and container handling packers and forklifts up to 35 tons; operated by Crescent Wharf and Warehouse Co.

Berths 4, 3, and 2: immediately SW of Berth 5; 1,765 feet long; 35 feet alongside; deck height, 14 feet; 23 acres of container storage area; one 40-ton and three 30-ton container handlers, one 40-ton A-frame mobile gantry crane; operated by Oakland Container Terminal Co., and Marine Terminal Corp.

Seventh Street Marine Terminal, on a peninsula between Oakland Outer and Middle Harbors, is a 140-acre container and general cargo complex with two main terminal areas: Matson Terminals, Inc., and the Marine Terminals Corp. Eight deep-draft berths provide 6,101 feet of berthing space at the complex. Cranes up to 40 tons, forklifts, straddle carriers, and tractors are available; 84 acres of container storage; water and electrical shore-power connections are at several of the berths. All deck heights are 14 feet. The complex is owned by the Port of Oakland. Details on the berths are:

Matson Terminals, Inc., Berths D and E (37°48′38″N., 122°19′44″W.): 1,500 feet long; 35 feet alongside.

Matson Terminals, Inc., Berth F: immediately SW of Berth E; 720-foot roll-on/roll-off marginal wharf; 35 feet alongside.

Seventh Street Public Container Terminal, Berths G, H, I, and J: immediately SW of Berth F; 2,963 feet long; 35 feet alongside; operated by Marine Terminals Corp.

Marine Terminals Corp., Berth O (37°48′21″N., 122°19′52″W.): 608-foot quay wall type wharf; 35 feet alongside; containerized, roll-on/roll-off and breakbulk cargo; operated by Marine Terminals Corp.

Facilities on N side of Inner Harbor:

United States Lines Container Terminal, Berths A and B (37°47′38″N., 122°18′09″W.): N side of Oakland Inner Harbor, about 1.4 miles east of the entrance; 1,443 feet long; 35 feet alongside; deck height, 14 feet; 20 acres open storage; two 45-ton low-profile container cranes; water and electrical shore-power connections; receipt and shipment of container cargo; operated by United States Lines.

American President Lines/Seatrain Container Terminal, Berths C and D: immediately E of and in line with United States Lines Container Terminal; Berths A and B: 1,300 feet long; 35 feet alongside; deck height, 14 feet; 33 acres container storage, 48,000 square feet covered cargo storage; two 54-ton low-profile container cranes; water and electrical shore-power connections; receipt and shipment of container cargo; operated by American President Lines and Seatrain Pacific Services.

Schnitzer Steel Products piers (37°47′43″N., 122°17′15″W.): the ends of four adjacent piers with dolphins, used to berth vessels up to 550 feet in length; depth at ends of all four piers, 34 feet; loading of vessels with metal scrap; owned and operated by the Schnitzer Steel Products of California, Inc.

Ninth Avenue Terminal (37°47′12″N., 122°15′32″W.): Berth 3, 952-foot face; Berths 2 and 1, immediately E of Berth 3, 1,100-foot berthing space; 35 feet alongside all berths; deck height, 14 feet; 177,200 square feet covered storage; 3.5 acres open storage; vessel loading spout served by conveyor system, loading rate 600 tons per hour magnesite or 250 to 300 tons per hour grain; four mobile cranes, three crawler cranes up to 100-ton capacity; water and electrical shore-power connections; receipt and shipment of general cargo, shipment of lumber, gypsum board, granular bulk materials, asphalt and steel; operated by Marine Terminals Corp.

Foreign-Traffic Zone No. 56 is in Oakland. (See chapter 1, Foreign-Trade Zones, and appendix for address.)

Supplies.–Bunker fuel, diesel oil, gasoline, water, and most other marine supplies and services are available in Oakland. Bunker fuel is usually delivered by barge.

Repairs.–A shipbuilding and repair firm in Oakland has a maximum drydock capacity of 2,800 tons, and another firm has marine railways capable of hauling out up to 800 tons. All kinds of repairs are made to both hulls and engines.

Small-craft facilities.–There are many small-craft facilities on both sides of the channel from Oakland Inner Harbor entrance to the airport at the S end of San Leandro Bay. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.) Mariners should exercise caution when transiting Oakland Inner Harbor to prevent wake damage to boats moored at marinas along the waterway.

Communications.–Oakland is served directly by three major highways, with connections to several others. The city is the main-line terminus of four transcontinental railroads. Metropolitan Oakland International Airport, on the bay about 5 miles SE of the city, is served by many airlines.

Charts 18649, 18652.–Berkeley, the site of the University of California, adjoins Oakland and **Emeryville** to the N. The long pier extending into the bay is marked by a light; the 1.7-mile offshore section of the pier is in ruins, and the inshore 3,000-foot section is used for fishing. In clear weather the Campanile (bell tower) at the university shows prominently from the bay.

Berkeley Yacht Harbor, on the N side of the long pier, is protected at the entrance by two detached breakwaters. The S breakwater is marked by a light on the S end, a light at the center, and a light and fog signal at the N end. The N breakwater is marked by a light on the NE and SW ends. The N side of the entrance into the harbor is marked by a private light, and the S side by a private light and fog signal. **Berkeley Reef,** awash, is 0.9 mile NW from the inner harbor entrance; it is marked by a light. About 925 boats can be accommodated in the harbor, including 20 guest berths. Transients should report to the harbormaster's office on the S side of the harbor.

Storm warning signals are displayed. (See chart.)

The marina at Emeryville, about 1.5 miles S of Berkeley Yacht Harbor, can accommodate about 300 small craft in an enclosed basin.

(See the small-craft facilities tabulation on chart 18652 for services and supplies available at Berkeley Yacht Harbor and at Emeryville.)

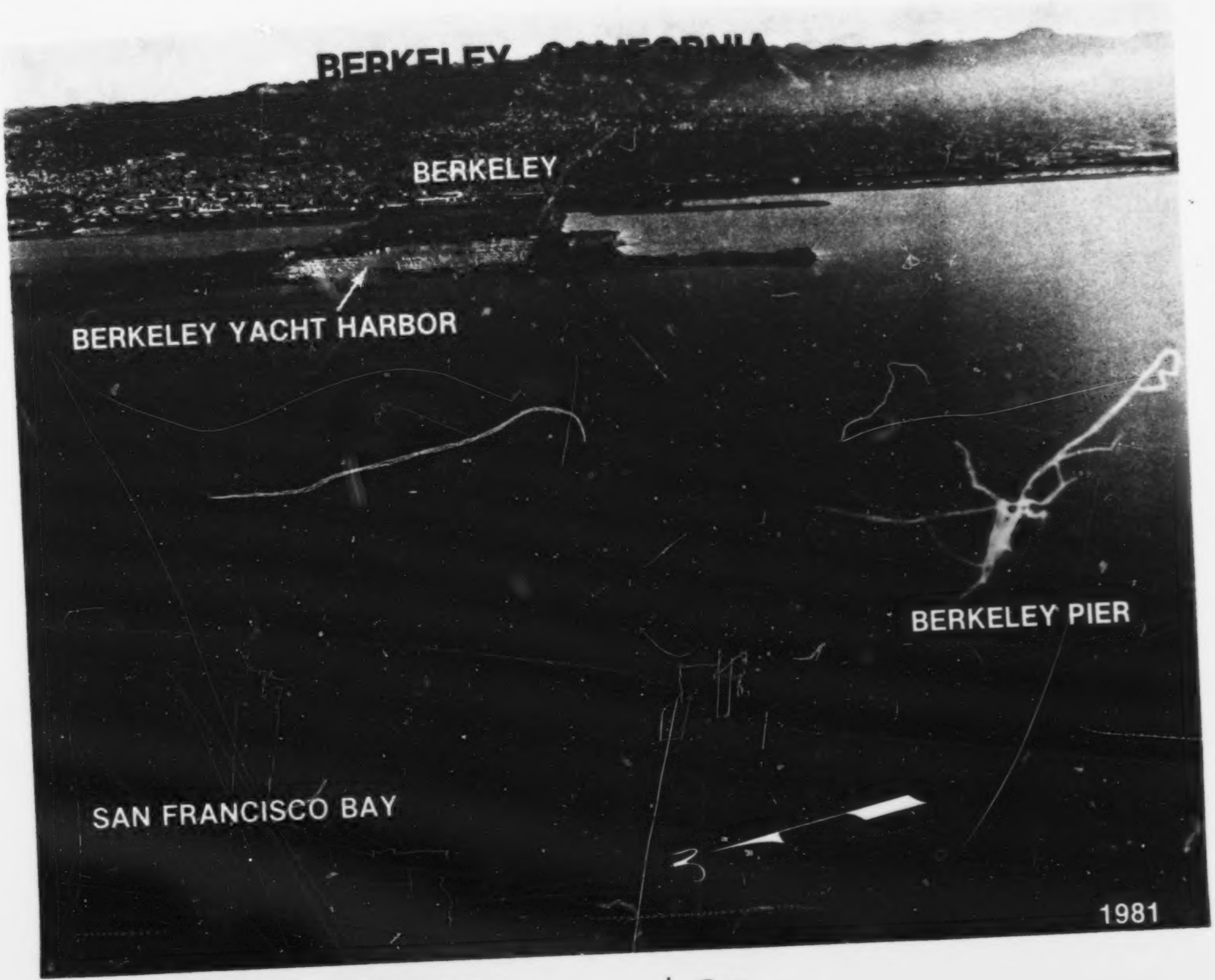
Southampton Shoal Light (37°52.9′N., 122°24.0′W.), 32 feet above the water, is shown from a white cylindrical tower near the S end of the 1.6-mile-long shoal. A fog signal is at the light. Degaussing ranges are between Southampton Shoal Light and Angel Island.

Vessels going from San Francisco Bay proper bound for Richmond usually use the 35-foot project channel through the shoal area NW of Southampton Shoal Light.

Red Rock, 3.2 miles NNW of Southampton Shoal Light, is 169 feet high and prominent in the S approach. Buoyed **Castro Rocks,** 0.6 mile ENE of Red Rock, are small and low.

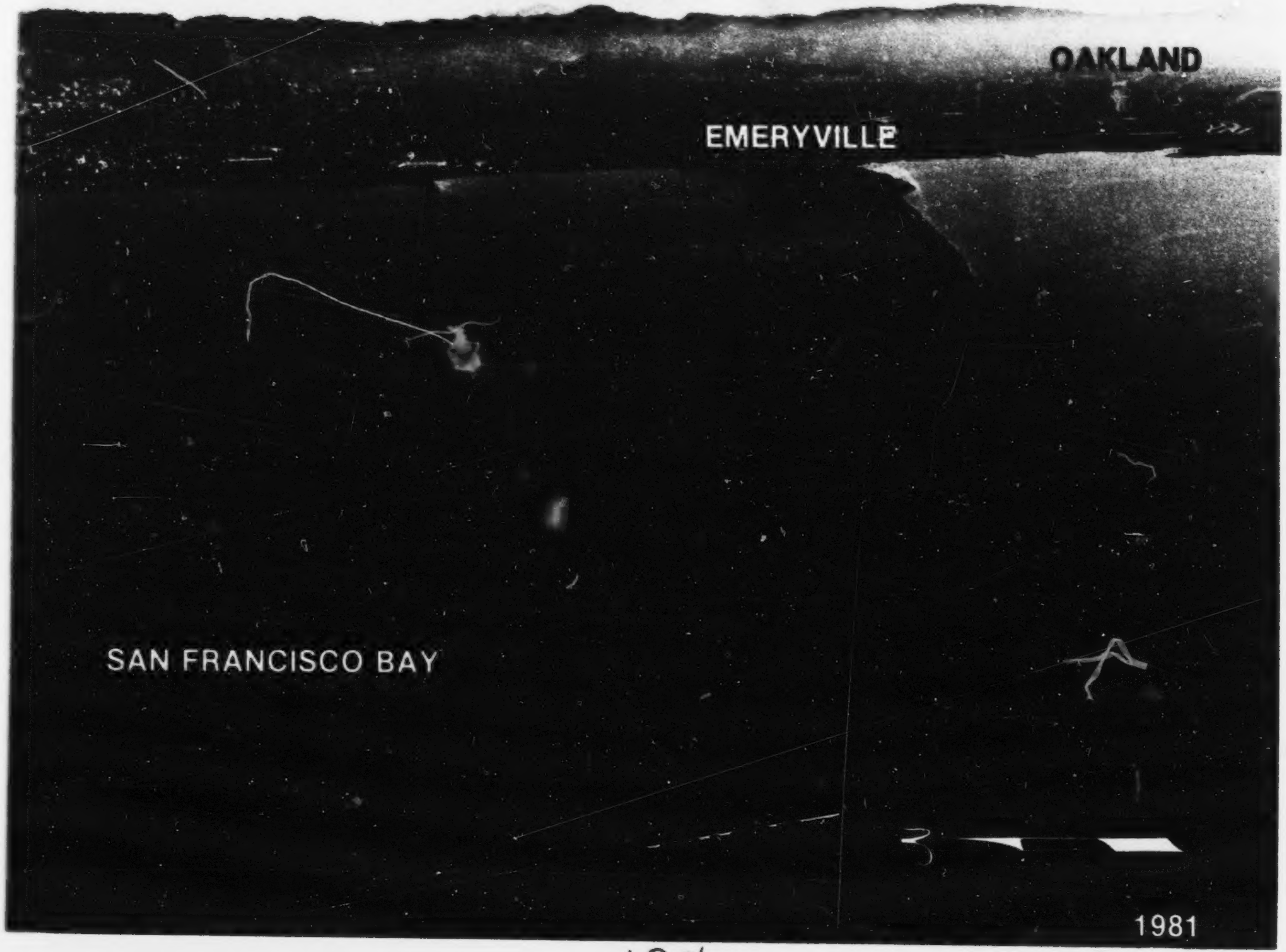
Richmond Harbor, on the E shore of San Francisco Bay 1.5 miles N of Southampton Shoal Light, includes the port facilities to Point San Pablo. The harbor is the terminus of the Atchison, Topeka, and Santa Fe Railroad and the Southern Pacific Lines, and is an important oil refining center and oil shipping port.

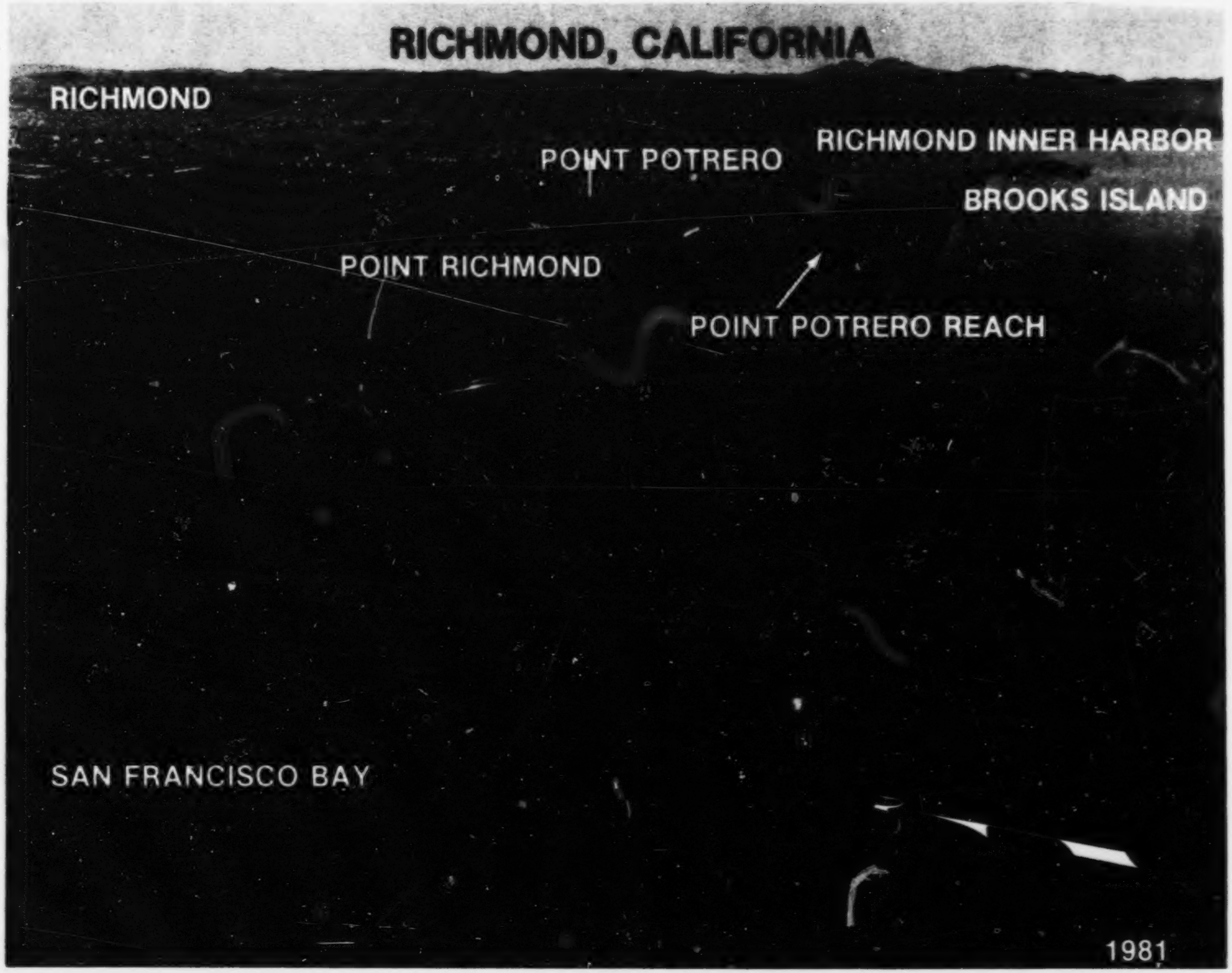
Channels.–A Federal project provides for a


BERKELEY, CALIFORNIA
BERKELEY
BERKELEY YACHT HARBOR
BERKELEY PIER
SAN FRANCISCO BAY
3
1981

BEST DOCUMENT AVAILABLE

EMERYVILLE, CALIFORNIA


OAKLAND
EMERYVILLE
SAN FRANCISCO BAY
1981

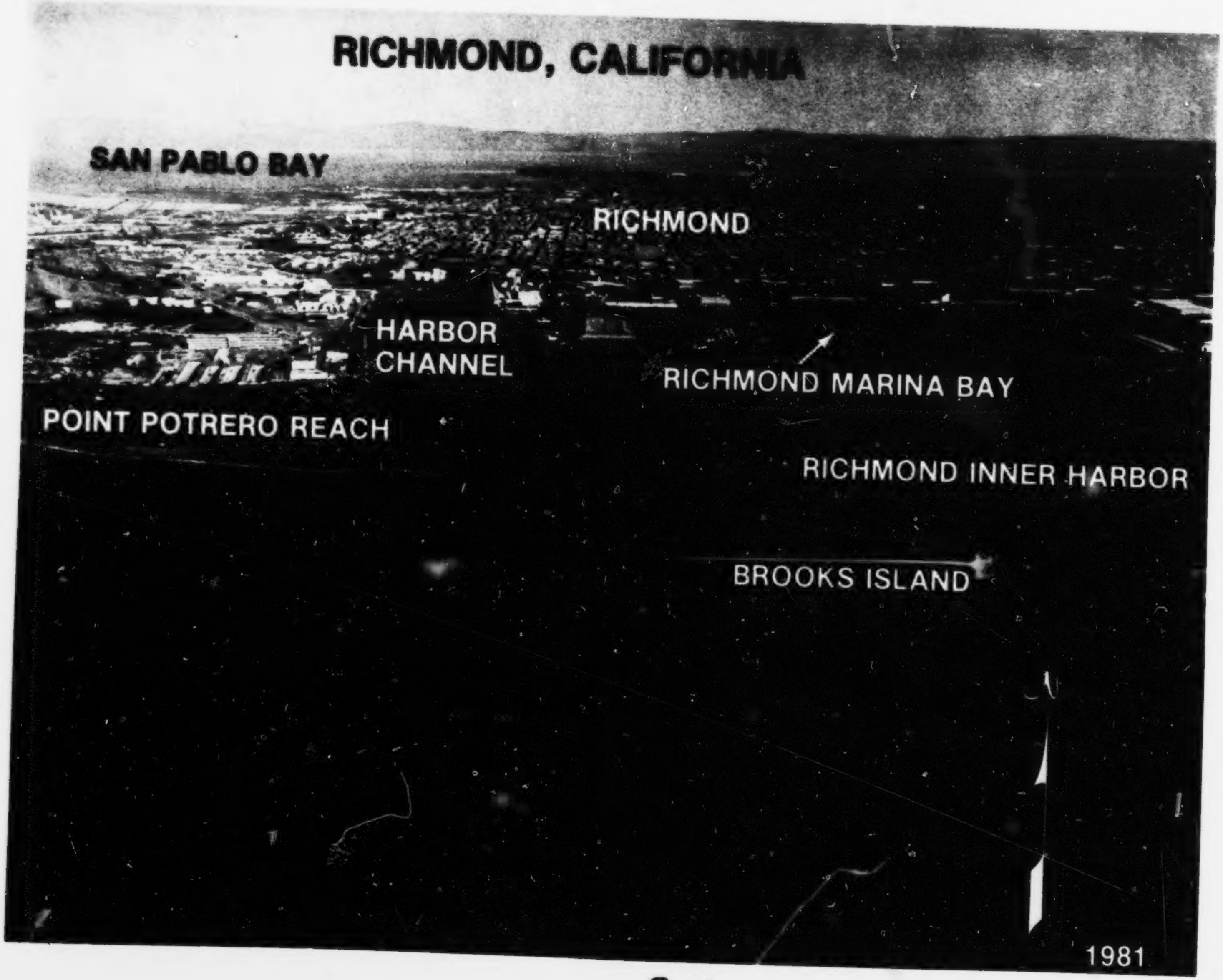


RICHMOND, CALIFORNIA

RICHMOND
POINT POTRERO
RICHMOND INNER HARBOR
BROOKS ISLAND
POINT RICHMOND
POINT POTRERO REACH
SAN FRANCISCO BAY

1981

199


RICHMOND, CALIFORNIA
SAN PABLO BAY
RICHMOND
HARBOR CHANNEL
RICHMOND MARINA BAY
POINT POTRERO REACH
RICHMOND INNER HARBOR
BROOKS ISLAND
1981

200

depth of 35 feet in the channel leading to the port facilities at Point Richmond, through Harbor Channel and for about 2,000 feet in Sante Fe Channel, thence 30 feet in the remainder of Sante Fe Channel and Turning Basin. The channel is well marked by navigational aids. (See Notice to Mariners and latest editions of charts for controlling depths.) A 10,000-foot training wall is S of the dredged channel and extends W from Brooks Island.

A Federal project further provides for an approach area 32 feet deep to the wharves at Point Orient and Point San Pablo. (See latest editions of charts for controlling depths.)

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Wharves.–The city of Richmond owns six deepwater terminals and operates three of them. The city leases several small wharves to private concerns engaged in handling fish, small-craft repair work and mooring, and shipping various commodities by barge. There are a number of private barge wharves. All major deep-draft facilities are described. The alongside depths given for each facility described are reported; the operators of the wharves should be contacted for information on the latest depths. Most of the large oil wharves have hose-handling cranes. Of the facilities described, all have truck access and rail connections to the Atchison, Topeka, and Santa Fe Railroad and/or Southern Pacific Lines. Water is available at all piers, and electrical shore power at some.

General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. For a complete description of the port facilities refer to Port Series No. 31, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Facilities at Richmond:

Richmond Terminal No. 4 (37°57′50″N., 122°25′41″W.): on the W side of Point San Pablo; 1,047-foot offshore wharf; 35 feet alongside; deck height, 14½ feet; receipt and shipment of petroleum products; vegetable and animal oils, and molasses; operated by Richmond Terminal Agency, Pacific Molasses Co., and Dorward Terminals, Inc.

Standard Oil Point Orient Wharf (37°57′20″N., 122°25′39″W.): 504-foot offshore wharf; 30 feet alongside; deck height, 14½ feet; electrical shore power connections; receipt and shipment of petroleum products; owned and operated by Standard Oil Co. of California; marked by private lights.

Standard Oil Richmond Long Wharf (37°55′25″N., 122°24′40″W.): 2,462-foot offshore wharf; 32 feet alongside; deck height, 15 feet; electrical shore power connections; receipt and shipment of petroleum products, bunkering vessels; owned and operated by Standard Oil Co. of California; marked by private lights.

Richmond Terminal No. 1 (37°54′30″N., 122°23′10″W.): marginal wharf, 557 feet long; 35 feet alongside; deck height, 13½ feet; receipt and shipment of petroleum products, chemicals, and petrochemicals; owned by the Port of Richmond and operated by Petromark, Inc. and Georgia-Pacific Inc.

Levin Metals Piers (37°54′18″N., 122°22′10″W.): two 540-foot finger piers just W of Point Potrero; depths alongside are 35 feet at the W pier and 22 feet at the E pier; dismantling ships for scrap salvage; owned by the Port of Richmond, operated by Levin Metals Corp.

Richmond Terminal No. 7 (37°54′35″N., 122°21′48″W.): 700-foot wharf; 35 feet alongside; import and export of automobiles; 53 acres of storage; owned and operated by Port of Richmond.

Richmond Terminal No. 3 (37°54′50″N., 122°21′39″W.): 1,009-foot concrete wharf; 35 feet alongside; container terminal with storage capacity for 2,640 container boxes; equipment available for loading and unloading vessels includes a 400-ton rail-mounted gantry crane, a container conveyor system, and a 74-foot wide transtainer for lifting containers from trucks to ground storage; owned by the Port of Richmond, operated by Matson Terminals, Inc.

Richmond Terminal No. 2: just N of Terminal No. 3; 550-foot wharf with a 710-foot usable berthing space, with dolphins; 35 feet alongside; receipt and shipment of vegetable oils, chemicals, and petrochemicals; owned by the Port of Richmond, operated by Pacific Vegetable Oil Company and Union Carbide.

Parr-Richmond Terminal No. 5 (37°55′12″N., 122°21′58″W.): deck height, 13 feet; SW side fronts on Sante Fe Channel, 650 feet long, 32 feet alongside; W side fronts on Lauritzen Canal, 1,200 feet long, 32 feet alongside; 35,000 square feet covered storage; cranes up to 50 tons, equipped with electromagnets, slings, or buckets; water is available; receipt and shipment of dry bulk cargoes, chemicals, steel, and petroleum products; owned and operated by Parr-Richmond Terminal Co.

Texaco Wharf (37°55′17″N., 122°22′08″W.): 635 feet long with dolphins; 35 feet alongside; deck height, about 8 feet; receipt and shipment of petroleum products; owned and operated by Texaco Inc.

Atlantic-Richfield Tanker and Barge Docks (opposite side of channel from Parr-Richmond Terminal No. 3): offshore wharves, the tanker wharf is 247 feet long and the barge wharf, N of the tanker wharf, is 151 feet long. The two wharves are spaced about 315 feet apart, and together they provide one large tanker berth; about 35 feet alongside both wharves; deck heights, 12 feet; receipt and shipment of petroleum products and bunkering vessels; owned and operated by Atlantic-Richfield Oil Corp.

Union Oil Tanker and Barge Docks: immediately N of the Atlantic Richfield Tanker and Barge Docks; offshore wharves, the tanker wharf, S of the two, is 300 yards N of the Atlantic-Richfield tanker wharf; tankers are berthed here in the same manner as at the Atlantic-Richfield facilities. The tanker wharf is 270 feet long, and the barge wharf is 268 feet long, including dolphins; space between the wharves is about 230 feet, providing a total berthing space of about 768 feet; depths alongside are about 35 feet; deck heights, 12 feet; receipt and occasional shipment of petroleum products and bunkering vessels; owned and operated by Union Oil Co. of California.

Repairs.–A shipyard, operated by the Port of Richmond, is at Point Potrero (37°54'18"N., 122°21'58"W.). The yard has five graving docks, the largest of which is 748 feet long, 84 feet wide, and 30 feet deep. All types of repairs to large vessels are made.

Small-craft facilities.–Most of the small-craft facilities are along Sante Fe Channel. A private yacht harbor is on the E side of Point Richmond, and a small marina is at **Castro Point,** about 1.9 miles S of Point San Pablo. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

The 21,343-foot Richmond-San Rafael Highway Bridge 8.8 miles above the Golden Gate Bridge, is one of the longest fixed high level double deck bridges. The E 970-foot fixed channel span clearance is 135 feet; the W fixed span has a 1,000-foot opening with a clearance of 185 feet. The bridge is well lighted, and the channels leading to it are marked with navigational aids.

A **restricted area** extends 0.3 mile offshore at **Molate Point,** site of a Navy fuel depot 0.8 mile N of Richmond-San Rafael Bridge. (See 207.640 (j), chapter 2, for limits and regulations.)

Invincible Rock, 1.3 miles N of Richmond-San Rafael Bridge, is covered 7 feet. **Whiting Rock,** covered 13 feet, is 0.2 mile NNE of Invincible Rock. Both rocks are buoyed.

The Brothers, 1.7 miles N of Richmond-San Rafael Bridge, are two small low flat-topped islands. **East Brother Island Light** (37°57.8'N., 122°26.0'W.), 61 feet above the water, is shown from a white square tower on dwelling on the E island. A seasonal fog signal is at the station.

Point San Pablo, 0.3 mile NE of East Brother Island Light, is the NW extremity of a low ridge of hills on the E shore of San Francisco Bay at its junction with San Pablo Bay. The point rises abruptly to a height of 140 feet. A dredged channel off the NE shore of the point is used by commercial and sport fishermen. Depths of 12 feet were reported in the channel to the fishery and the former whaling station docks.

A small-boat basin used by sport fishermen is 0.5 mile SE from Point San Pablo.

A private yacht basin is 1 mile SE from Point San Pablo. A channel leading to the basin has reported depths of about 2 feet.

Point Cavallo, on the W side of San Francisco Bay 0.5 mile NE of the Golden Gate Bridge, is sharp and rocky with some visible and covered rocks under its face. **Horseshoe Bay,** a shallow bight W of the point, is part of a military reservation and only available to the public in case of an emergency. The E entrance point to Horseshoe Bay is marked by a private light.

From Point Cavallo the steep rocky shore tends N for 0.3 mile to **Yellow Bluff,** thence NW for 1 mile to Sausalito. In February 1979, an obstruction covered 5 feet was reported about 0.1 mile ESE of Yellow Bluff.

Richardson Bay, 2 miles N of the Golden Gate Bridge, is shoal except for the S part fronting Sausalito. A **special anchorage** is in Richardson Bay. (See 110.1 and 110.126a, chapter 2, for limits and regulations.) A channel leading NW through Richardson Bay to facilities at Sausalito is marked by lights and buoys.

Sausalito harbors many commercial fishing boats and pleasure craft. Several boatbuilding and repair yards have marine ways, the largest of which can handle craft up to 350 tons. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

The Corps of Engineers has an operations base and model current-flow basin at Sausalito.

Belvedere Cove, 3 miles NNE of the Golden Gate Bridge, is entered between **Peninsula Point** on the S and **Point Tiburon** on the N. A **general anchorage** is in the cove. (See 110.1 and 110.224 (a)(1) and (g), chapter 2, for limits and regulations.) Two private yacht clubs are in the cove. There are several small piers used by ferry boats about 0.2 mile W of Point Tiburon. Passenger ferry service is available between Tiburon and San Francisco and between Tiburon and Angel Island. The ruins of an abandoned railroad ferry slip is just W of Point Tiburon.

Angel Island, 3 miles NE of the Golden Gate Bridge, is partially wooded and level on top. The irregular-shaped island is separated from the mainland by Raccoon Strait. The island, formerly an immigration detention station, is now a State park. A ferry operates between the island and Tiburon.

Point Blunt, the SE extremity of Angel Island, terminates in a 60-foot-high knob, and is connected with the island by a low neck of land. **Point Blunt Light** (37°51.2'N., 122°25.1'W.), 60 feet above the water, is shown from a white house on the point; a fog signal is at the station. A special radio direction-finder calibration station is at the light. (See Light List for details.) A shoal with visible and covered rocks extends SSE for 0.1 mile. Tide rips and swirls are heavy around the point, especially with a large falling tide.

Quarry Point, the E end of Angel Island, is a bold bluff with deepwater close-to. The wharf 0.6 mile N of the point is in poor condition and is not used. The point is marked by a light.

A light is on **Point Stuart,** the W extremity of Angel Island. A shoal area covered 14 to 30 feet, extending SW from **Point Knox,** is marked by a lighted buoy.

Ayala Cove, indenting the N side of Angel Island, about 0.6 mile NE of Point Stuart, is reported to afford good anchorage in depths of 10 to 12 feet, mud bottom, and protection from S and W winds. A pier at a State park facility in the cove is used by ferries and State park personnel.

Raccoon Strait, nearly 0.5 mile wide between Angel Island and the mainland, is part of the Vessel Traffic System's recreation area and is used by ferry boats and pleasure craft. The tidal currents in the strait have considerable velocity, and rips and swirls are heavy at times. A midchannel course can be followed. **Raccoon Shoal,** covered 29 feet, is 500 yards N of Raccoon Strait Light 4. A strong ebb current sets directly across the channel at the E entrance.

Bluff Point, on the mainland and marked by a light, is the E extremity of Tiburon Peninsula 1.2 miles N of Point Stuart. The pier and buildings of the oceanographic research facility of the U.S. Department of Commerce are 0.8 mile NW of Bluff Point.

Paradise Cay, a filled real estate project 2.6 miles NW of Bluff Point, has a small-boat harbor that accommodates about 100 boats. The harbor is on the N side of the project.

Corte Madera Creek, at the head of a marshy bight about 2 miles NW of Paradise Cay, is the site of a ferry terminal.

A privately dredged and marked channel leads NW from deep water in the bay over the flats to a turning basin at the mouth of the creek. In 1976, the controlling depth in the dredged channel was 11 feet, thence natural depths in the creek were 3 to 12 feet to the twin fixed highway bridges, 0.5 mile above the turning basin. The fixed bridges have 40-foot channel spans with a clearance of 21 feet. The railroad bridge, just below the fixed bridges, has a 40-foot bascule span with a clearance of 10 feet. (See 117.1b, 117.710 and 117.712(e), chapter 2, for drawbridge regulations and opening signals.) The power cables over the turning basin and creek have a least clearance of 120 feet.

Point San Quentin, at the W end of the Richmond-San Rafael Bridge, has low land on either side. The buildings of the State Prison S of the bridge and the long wharf N of it are prominent. A State **restricted area,** marked by private buoys at the outer boundary, extends off the SE side of Point San Quentin. The buoys are orange and white and display the words "San Quentin Prison."

San Rafael Creek, 1.8 miles NW of Point San Quentin, is used by many small craft basing at the city of **San Rafael.** A dredged channel leads across the flats in **San Rafael Bay** into San Rafael Creek to a turning basin about 1.1 miles above the mouth, thence for another 0.3 mile above the turning basin. In 1977-February 1978, the midchannel controlling depth was 7 feet in the entrance channel to the mouth of the creek; thence in July 1980, a controlling depth of 3½ feet was at midchannel from the mouth of the creek to the turning basin with 1 foot in the basin, thence shoaling to bare to just above the turning basin. The channel entrance is marked by a **293°** lighted range, lights, and daybeacons. The overhead power cables near the entrance to the creek have a clearance of 125 feet. The Grand Avenue Bridge has a 30-foot fixed span with a clearance of 4 feet.

The municipal yacht harbor is on the S side of San Rafael Creek, about 400 yards E of the turning basin, and there are numerous small-craft facilities elsewhere along the creek. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Point San Pedro, 3 miles N of Point San Quentin at the W entrance to San Pablo Bay, extends 100 yards E of 356-foot-high **San Pedro Hill.** Three charted brick stacks are just S from the point. There is a large quarry just N from the point.

Charts 18654, 18652, 18658.–San Pablo Bay, is nearly circular, 10 miles long in a NE direction, with a greatest width of 8 miles. The N part consists of low marshes intersected by numerous sloughs and a large area of shoal water and mudflats that bare at extreme low water. The S shore is bolder, except between Point San Pablo and Pinole Point, where it is low and marshy for about 3 miles. Carquinez Strait joins San Pablo Bay with Mare Island Strait and Suisun Bay at its E extremity. There is considerable traffic through the bay. Deep-draft oil tankers and sugar-laden vessels pass through the bay bound for Crockett and Martinez. Lighter draft vessels pass through bound for points on Suisun Bay, and the Sacramento River to Sacramento, and on the San Joaquin River to Stockton.

The San Francisco Bay navigation radio channel, VHF-FM channel 18 (156.90 MHz), is used by the Marine Exchange, the bridges on the San Joaquin and Sacramento Rivers, and the Ports of Stockton and Sacramento. In the San Francisco Bay region, this is also the radio channel for bridge-to-bridge communication between vessels having the VHF-FM equipment. VHF-FM channel 10 (156.50 MHz) is used for business and operations communications between the Marine Exchange, shipping concerns, towing companies, pilots, and the Coast Guard Captain of the Port. In addition, VHF-FM channel 16 (156.80 MHz) is used for sending distress, urgent, or safety messages to the Coast Guard. The Coast Guard Captain of the Port, San Francisco, also broadcasts notices to mariners and storm warnings.

The marked channel through San Pablo Bay extends in a gentle curve N and E from the entrance to the E end. The Federal project depth is 35 feet across Pinole Shoal. (See Notice to Mariners and latest editions of charts for controlling depths.) Pinole Shoal Channel is reserved for use of vessels drawing more than 20 feet. (See 162.205, chapter 2, for navigation regulations.)

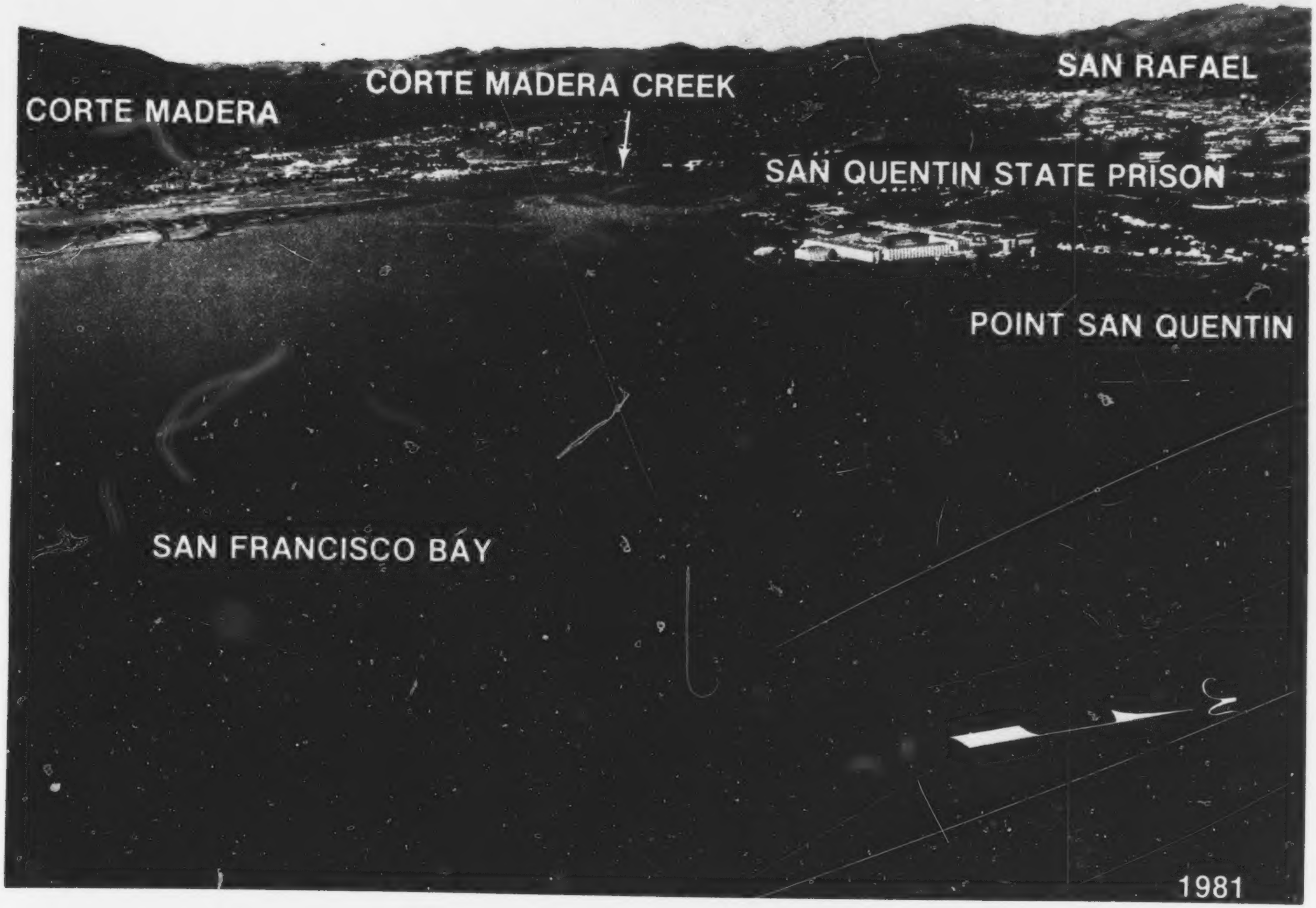
General and **naval anchorages** are in San Pablo Bay. (See 110.1 and 110.224 (b) and (g), chapter 2, for limits and regulations.)

Shoals and flats, which uncover, extend from Point San Pablo to Pinole Point, thence NE to Lone Tree Point.

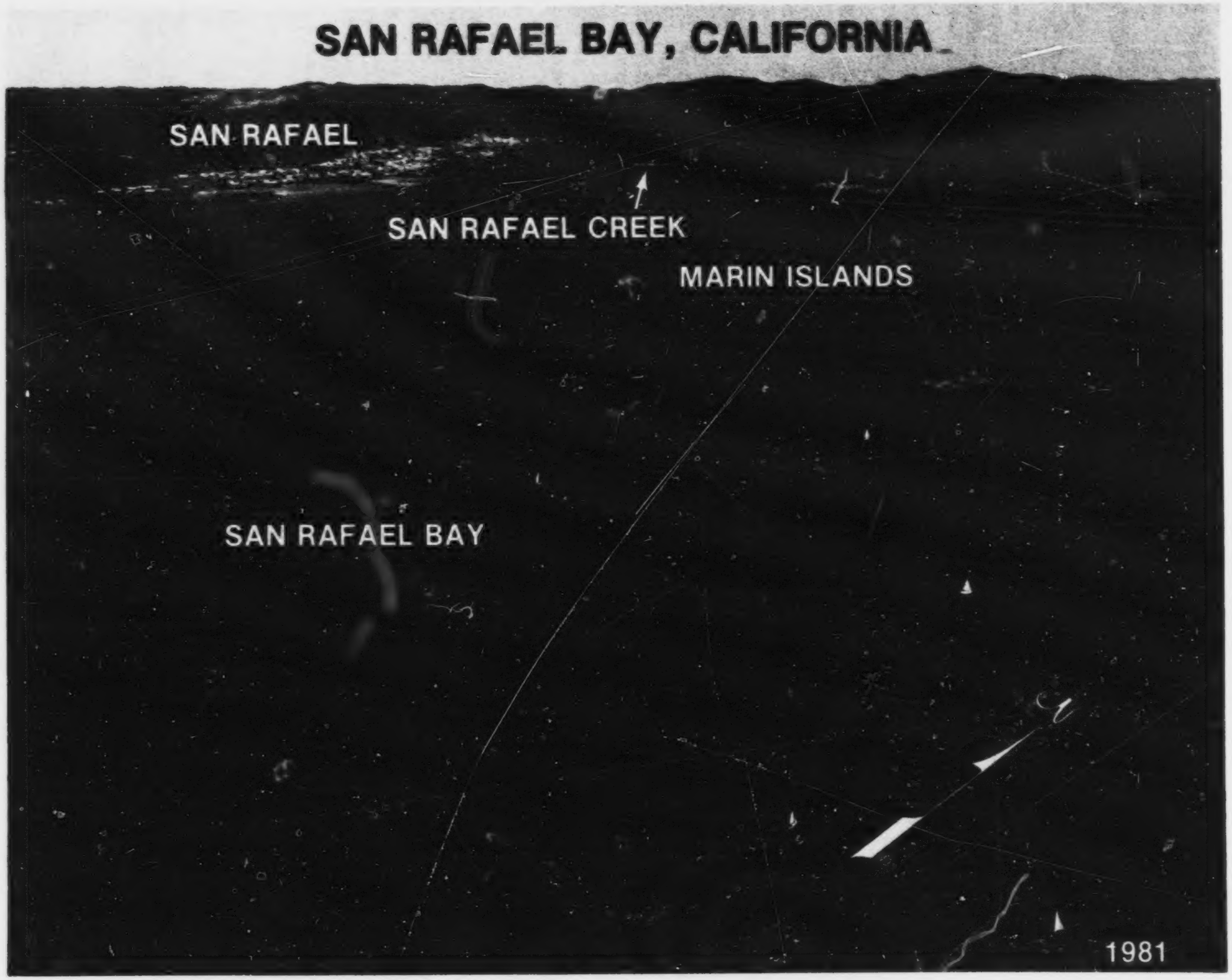
Pinole Point is a moderately high, rocky bluff, projecting about 1 mile from the SE shore of San Pablo Bay. A T-head fishing pier extends NW

BEST DOCUMENT AVAILABLE

CORTE MADERA CREEK, CALIFORNIA


CORTE MADERA
CORTE MADERA CREEK
SAN RAFAEL
SAN QUENTIN STATE PRISON
POINT SAN QUENTIN
SAN FRANCISCO BAY
1981

SAN RAFAEL BAY, CALIFORNIA


SAN RAFAEL
SAN RAFAEL CREEK
MARIN ISLANDS
SAN RAFAEL BAY
1981

BEST DOCUMENT AVAILABLE

205

from the E side of the point. Piles and a light are off the face of the pier. The ruins of a former wharf extend from the E side of the point, and numerous oil tanks are on the hills about 2 miles in back of it. About 3.5 miles E of Pinole Point, the black elevated tank at a chemical fertilizer plant is prominent. A water intake structure at the plant extends about 800 yards offshore. A pleasure fishing pier and a small-craft harbor are at **Lone Tree Point,** 4.6 miles E from Pinole Point. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.) A steel skeleton tower is 0.6 mile S of Lone Tree Point. **Oleum,** on **Davis Point,** is an oil town. There are many prominent oil tanks, painted in pastel colors, on the hills back of the town. A large "Union 76" sign and six stacks in a line SE of Davis Point are also prominent.

The Union Oil Co. T-shaped wharf, frequently used by tankers, extends out from the Oleum refinery on Davis Point. Depths of 35 to 38 feet are alongside the 1,250-foot face of the wharf. All four corners of the wharf are marked by private lights, and a private fog signal is at the W and E ends; the trestle leading to the wharf is lighted at night. The deck height is 17 feet. Water and shore power are available. Pipelines extend from the wharf to the refinery and to storage tanks at the company's Richmond terminal.

The Sequoia Refining Corp. Wharf, 0.5 mile offshore, is about 1,000 yards W of the T-shaped wharf. The wharf is about 1,280 feet long with depths alongside 32 to 35 feet. Deck height is 20 feet. The E and W ends are marked by private lights, and a fog signal is at the center of the wharf. Pipelines lead from the wharf SW to the shore just S of Lone Tree Point.

A 545-foot wharf with depths of 32 to 35 feet alongside is at **Selby,** about 0.8 mile E of the oil wharves at Oleum. In 1973, the wharf was inactive.

Petaluma River enters San Pablo Bay on the NW side. The city of **Petaluma,** 12 miles above the mouth, is the center of an extensive dairy and egg industry. The river is used by pleasure craft and by barges handling gravel, oyster shell, heavy construction equipment, and prestressed concrete products.

A marked dredged channel leads through San Pablo Bay to the entrance to Petaluma River. In July-August 1980, the midchannel controlling depth was 3½ feet across the flats in San Pablo Bay to the mouth of the river, thence in 1971, 7 feet to **Haystack Landing,** about 10 miles above the mouth, thence 2 feet to **McNear Canal,** just below Petaluma, thence bare to 6 feet to the turning basin, thence 4 feet in the basin. In 1973, a shoal was reported encroaching into the channel from the NE side of the river, about 0.5 mile below the Haystack Landing railroad bridge. A partially submerged wreck is near the center of the river in about 38°12'01"N., 122°33'52"W., about 3 miles below the bridge. Least clearances over Petaluma River are: drawbridges, 4 feet; fixed bridges, 8 feet; and power cables, 70 feet. (See 117.1b, 177.710 and 117.712 (g), chapter 2, for drawbridge regulations and opening signals.)

A privately dredged channel with private markers leads SSW from the dredged entrance channel to Petaluma River just below the entrance to the river and thence to **Novato Creek.** In 1977, the reported controlling depth was 1 foot.

Danger zones are in the E part of San Pablo Bay adjacent to the W shore of Mare Island and in the N central part of the bay. (See 204.215 and 204.216, chapter 2, for limits and regulations.)

Charts 18655, 18652.–Mare Island Strait, at the mouth of the Napa River, is between the mainland and **Mare Island.** South Vallejo and Vallejo are on the E side of the strait and the Mare Island Naval Shipyard is on the W side, about 2 miles above the S entrance. Project depths for the Mare Island Strait Channel, from the entrance to the first bridge (Vallejo-Mare Island Causeway Bridge), about 2.9 miles above the entrance, is 30 feet, except for 26 feet at the N end. (See Notice to Mariners and latest editions of charts for controlling depths.) In the 0.6-mile section between the first and second bridges, shoal spots limit the controlling depth in this area to about 13 feet. With local knowledge and use of the chart, drafts of 20 feet can be taken to the second bridge.

Notice.–Ships destined for **Mare Island U.S. Naval Shipyard** should await arrival of the Navy pilot at Carquinez Strait. The waters around Mare Island are included in a **restricted area.** (See 207.640 (1), chapter 2, for limits and regulations.)

A power cable crossing lower Mare Island Strait between South Vallejo and Mare Island has a clearance of 205 feet. If the clearance between the masthead and the cable is less than 10 feet or if the clearance is not known, vessels shall not move under the cable without authority from the pilot.

The entrance to Mare Island Strait is between two dikes. On the E side of the entrance, Dike No. 9 extends about 700 yards SW from the mainland; and on the W side, Dike No. 14 extends about 500 yards SE from Mare Island. About 110 yards of the outer section of Dike 14 is submerged. Both dikes are marked at the outer ends by lights.

South Vallejo, on the E shore of Mare Island Strait inside the entrance, is the terminal of a railroad connecting interior N points. A large flour mill is prominent S of the railroad yard.

Vallejo, 1 mile above South Vallejo, is of little commercial importance. The city supplies a large amount of fresh provisions to the naval shipyard and affords residences for employees and others attached there. It is also a distributing point for a considerable agricultural area in its vicinity. The shipyard, on the W side of Mare Island Strait, has drydocks and extensive facilities for repairing and building vessels of all sizes. A passenger ferry operates between Vallejo and the shipyard.

The Vallejo Marina, S of the Vallejo-Mare Island Causeway on the E side of Mare Island Strait, has accommodations for about 400 boats. Other small-craft facilities are also on the E side of the strait. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Storm warning signals are displayed. (See chart.)

The Vallejo-Mare Island causeway and lift bridge connect Mare Island with the city of Vallejo near the N end of the Naval Shipyard. It has a lift span with a clearance of 100 feet up and 12 feet down. (See 117.1b, 117.710 and 117.712 (i)(1), chapter 2, for drawbridge regulations and opening signals.) The bridge is equipped with radiotelephone. The bridgetender can be contacted on VHF-FM channel 13 (156.65 MHz); voice call, Mare Island Causeway Bridge. Just above **Sears Point,** 1 mile above Vallejo, a fixed highway bridge with a clearance of 100 feet crosses the strait. A public fishing pier is close S of this bridge and extends about 350 yards from the E side of the strait. A Navy reserve fleet pier is on the W side of the strait between Vallejo-Mare Island causeway and lift bridge and the fixed bridge just above Sears Point. If practical, approach the bridges only when running against the current. No passage should be attempted during the periods of peak flood or ebb current.

Charts 18654, 18652.–Napa River, the continuation of Mare Island Strait above the naval shipyard, is used by barges and pleasure boats. Barge traffic on the river is in crushed rock, salt, and steel.

Depths of about 9 feet can be carried in Napa River from above the Vallejo-Mare Island Causeway Bridge to Goodluck Point, about 5 miles above the bridge, thence in September 1980, a midchannel depth of 2½ feet to the turning basin at **Jacks Bend.** The bottom is very irregular in the turning basin with much of the basin bare at low water. With local knowledge, a depth of 6 feet could be obtained through Jacks Bend turning basin, thence a midchannel depth of 1 foot to the head of navigation at **Napa,** 13 miles above the causeway bridge. Heavy nonuniform shoaling occurs in Napa River; local knowledge is advised for navigation above **Horseshoe Bend.** Numerous snags have been reported to exist between Napa River Lights 15 and 16. Napa River is marked from the head of Mare Island Strait to Horseshoe Bend by a buoy and daybeacon, lights, and a lighted range; the 180° range marks the channel off Dutton Landing at Brazos.

The railroad bridge across Napa River just above Dutton Landing at **Brazos,** about 6.8 miles above the Vallejo-Mare Island Causeway, has a vertical lift span with a clearance of 2 feet down and 97 feet up. (See 117.1b and 117.710, chapter 2, for drawbridge regulations and opening signals.) The channel through the bridge crosses from one bank to the other causing a hazardous condition, particularly for downbound loaded barges, because the direction of the ebb current is as much as 50° from the axis of the channel.

In 1975, a temporary haul road retractable span bridge, with a design clearance of 107 feet, was under construction across the Napa River near Suscol, about 8.4 miles above the Mare Island Causeway Bridge. The bridge will be left in the open position when not in use.

Near **Imola,** 12 miles above Vallejo-Mare Island Causeway Bridge, the highway bridge crossing the river has a lift span with clearances of 25 feet down and 60 feet up. (See 117.1b, 117.710 and 117.712 (i)(3), chapter 2, for drawbridge regulations and opening signals.) The three fixed bridges in Napa have a minimum width of 47 feet and a clearance of 10 feet. The minimum clearance of the power cables crossing the river below Napa is 125 feet, and in Napa, 40 feet.

A small-craft basin is on the W side of Napa River opposite **Bull Island,** 8 miles above the Vallejo-Mare Island Causeway, and several other small-craft facilities are elsewhere on the river. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18656, 18652.–Six-mile-long **Carquinez Strait** connects San Pablo and Suisun Bays. For the first 3.5 miles it is a little less than 0.5 mile wide, and then widens to about 1 mile. It is deep throughout with the exception of a small stretch of flats on the N shore, and a small shoal area in the bight on the S shore near the E end. There are several small settlements on both shores. **General anchorages** are in Carquinez Strait. (See 110.224 (c) and (g), chapter 2, for limits and regulations.)

Charts 18655, 18652.–The **California State Maritime Academy** and pier are in **Morrow Cove,** on the N shore of the W entrance to Carquinez Strait.

Twin fixed highway bridges cross Carquinez Strait near its W entrance at **Semple Point.** The channel on each side of the center pier is 998 feet wide; the clearances are 146 feet through the N span and 134 feet through the S span. Private fog signals are sounded at the bridges; an aerolight is atop the center pier.

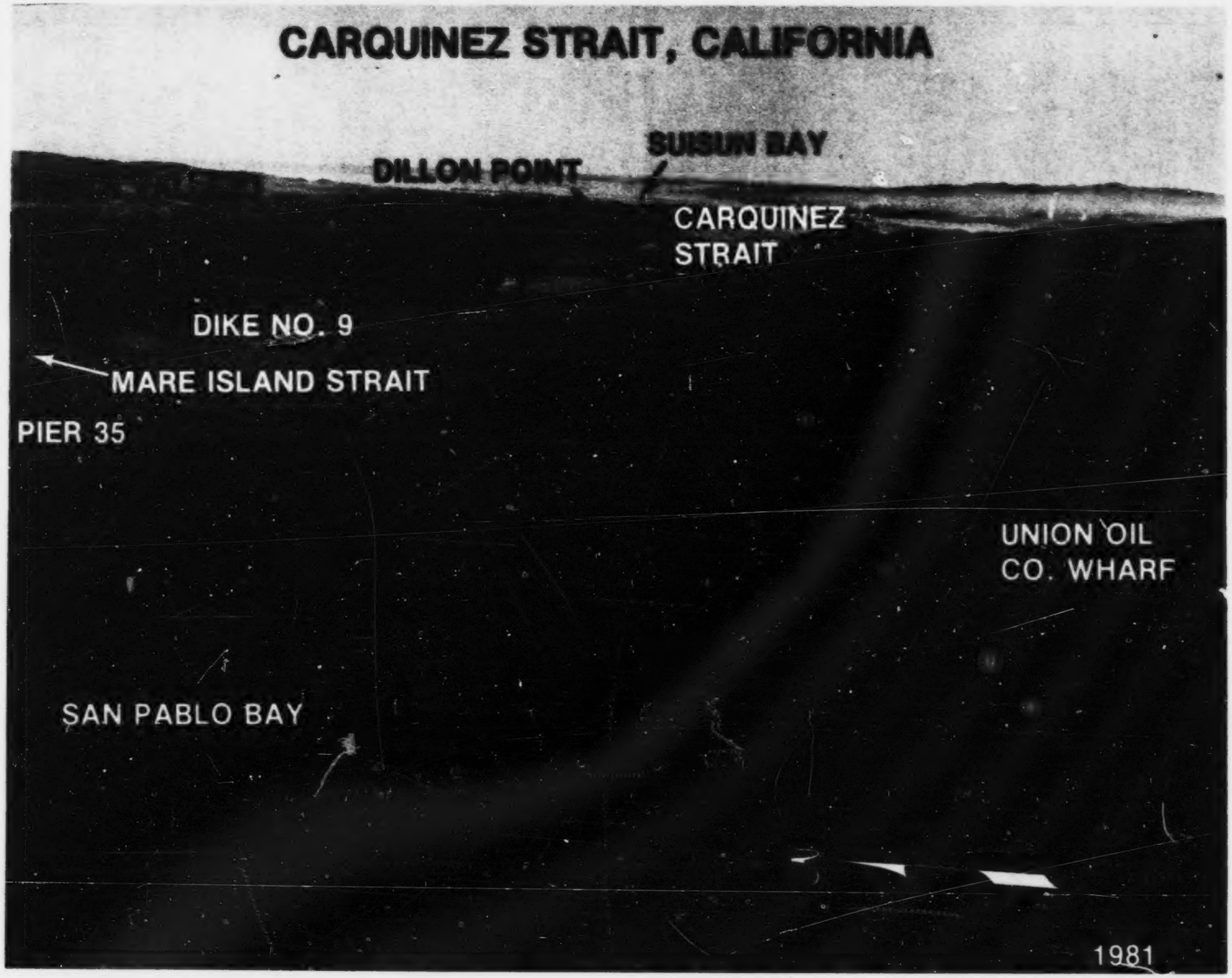
Power cables cross the strait 0.3 mile W of the bridges and 1.2 miles E of it; the minimum clearance is 179 feet.

Crockett, on the S shore just E of the twin bridges, is built around The California and Hawaiian Sugar Co. Refinery. The refinery's wharf has a 2,715-foot face and a deck height of 12 feet, and accommodates deep-draft vessels that discharge sugar from Hawaii. A depth of 35 feet is alongside. Cranes and a conveyor system serve the wharf, and water is available.

A marina is on the S shore just W of the twin highway bridges, and a small-boat basin is in **Elliot Cove** on the N side of the strait opposite Crockett. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18657, 18652.–A light and seasonal fog signal are 130 yards off the S side of Carquinez Strait, 1.5 miles E of the Carquinez twin bridges; another light and seasonal fog signal are onshore at **Port Costa,** 0.6 mile to the E. On the N side of the strait, a light is on **Dillon Point** and another is off **Benicia Point.**

BEST DOCUMENT AVAILABLE


CARQUINEZ STRAIT, CALIFORNIA
SUISUN BAY
DILLON POINT
CARQUINEZ STRAIT
DIKE NO. 9
MARE ISLAND STRAIT
PIER 35
UNION OIL CO. WHARF
SAN PABLO BAY
1981

Phillips Petroleum Co. Wharf, on **Point Carquinez,** on the S side of the strait about 0.5 miles SE of Port Costa, is a 575-foot marginal wharf, 675 feet usable with dolphins; depths of 35 to 45 feet are reported alongside; deck height is 13 feet. In 1973, the wharf was being used as a lay berth for barges.

A wharf is about 0.2 miles S of the Phillips Petroleum Co. Wharf on Point Carquinez. A shed at the wharf is in ruins. A brickyard is back of the wharf.

The Ozol Oil Wharf, at **Ozol** about 1 mile E of Point Carquinez, is a 207-foot offshore wharf; in 1977, a depth of 38 feet was alongside; deck height is 8 feet; it is owned by the Holly Corp. and operated by Salton-Riviera, Inc.

There are three wharves extending out to deep water at **Martinez,** 2 miles SE of Point Carquinez.

The westernmost of these facilities is the municipal fishing pier with an inactive ferry slip on its W side. A small-boat harbor, protected by breakwaters, is on the E side of the pier. A private light is on the channel end of both breakwaters. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

The Shell Oil Co. Wharf, E of the municipal fishing pier, is a 900-foot offshore wharf, 1,850 feet usable with dolphins; depth of 45 feet alongside; deck height is 15 feet. The wharf is marked by private lights and a fog signal.

The Phillips Petroleum Amorco Oil Wharves, 400 yards E of the Shell Oil Co. Wharf, have depths of 38 feet alongside and both are used for bunkering vessels as well as the receipt and shipment of petroleum products. Water and electrical shore power connections are available. The W wharf is a 76-foot offshore wharf with 281 feet usable with dolphins; deck height is 15 feet. The E wharf is a 76-foot offshore wharf with 512 feet usable with dolphins; deck height is 17 feet. Both wharves are marked by private lights.

Benicia is on the N shore at the E end of Carquinez Strait. Most of the smaller piers around the town are in ruins.

The **Port of Benicia,** at Army Point at the E end of the town, consists of a 2,400-foot-long offshore wharf at about 38°02'32"N., 122°08'00"W., and a smaller offshore wharf immediately NE. It is a former U.S. Army Arsenal and is leased to Benicia Industries Inc., and Exxon Co. Highway and railroad connections, and water and electrical shore power connections are available at all of the facilities. Depths alongside the SE side of the wharves are 30 to 35 feet, and all deck heights are 15 feet.

The Exxon Oil and Refining Co. Product Wharf, the W 800-foot portion of the long wharf, is used for the receipt and shipment of petroleum products.

The Benicia Terminal Co. Wharf, the E 1,604-foot portion of the long wharf, has a conveyor system. It is used for the receipt and shipment of general cargo, receipt of automobiles, and shipment of bulk products. It is operated by the Benicia Industries Inc.

Exxon Oil and Refining Co. Product Wharf, immediately NE of the long wharf, has more than 1,000 feet of berthing space with dolphins and is used for the receipt of crude petroleum.

Two bridges cross Carquinez Strait at the E end from **Army Point** to **Suisun Point.** The fixed Benicia-Martinez Highway Bridge has a clearance of 135 feet over Suisun Point Reach; the railroad lift bridge has a clearance of 70 feet down and 135 feet up over the channel. (See 117.1b and 117.710, chapter 2, for drawbridge regulations and opening signals.) The bridge is equipped with VHF-FM channels 13 (156.65 MHz), working frequency, and 16 (156.80 MHz). Call sign: KQ-7193, Southern Pacific Railroad Bridge. **Bulls Head Point,** just E of the S end of the bridge, shows as a 100-foot rounding hill with a prominent high white stack on it.

The Phillips Petroleum Co. Avon Pier extends across the flats at **Avon,** 1.5 miles E of the Suisun Point bridges. Depths alongside the 1,320-foot channel face are about 38 feet; deck height is 19 feet, with 14 feet at the center section. Water and electrical shore power are available. Tankers berth along the channel side of the face, and barges along the inshore side of the face. Fuel barges bunkering vessels in the San Francisco Bay area load here. Private lights and fog signals are on the outer ends of the pier.

The Urich Oil Wharf, 955 feet long with dolphins, is 0.5 mile W of the Phillips Petroleum Co. Avon Pier. In 1977, it had a reported depth of 32 feet alongside except for a 23-foot spot near the W end.

Charts 18656, 18652.–Suisun Bay is a broad shallow body of water with marshy shores and filled with numerous marshy islands, many of which have been reclaimed and are now under cultivation. It is practically the delta of the Sacramento and San Joaquin Rivers which empty into the E part of the bay. Two narrow winding channels lead to the mouths of the rivers. They are marked by lights. The rivers and the channels near the mouths have been improved by the Government to increase the depth, remove obstructions, and provide relief during freshet seasons. A Federal project provides for a main channel 30 feet deep through the bay to the San Joaquin River. (See Notice to Mariners and latest editions of charts for controlling depths.)

The bay is used by many light-draft vessels having local knowledge. It is recommended that large vessels take a pilot if bound above Crockett. For information on obtaining an inland pilot contact the San Francisco Marine Exchange.

General anchorages are in Suisun Bay. (See 110.1 and 110.224(d) and (g), chapter 2, for limits and regulations.)

Suisun Slough empties into the NW side of Suisun Bay 5.5 miles N of Benicia. A dredged channel leads from Suisun Bay into the entrance to the slough. In 1972, the controlling depth was 6 feet for a midwidth of 150 feet. The entrance channel is marked by lights. Above the dredged channel the channel has a controlling depth of about 8 feet to **Suisun City,** 12 miles above the entrance. The mean range of tide is about 5 feet. Traffic on the slough includes gasoline, jet fuel, and residual fuel oil. Petroleum products are barged to an oil distributor at Suisun City. A power cable with a clearance of 110 feet crosses the slough just S of the city.

A **restricted berthing area** for Maritime Administration Reserve Fleet vessels is along the W side of Suisun Bay. (See 162.270, chapter 2, for limits and regulations.)

(See 117.1b, 117.710, and 117.713, chapter 2, for drawbridge regulations and opening signals for the bridges over the minor tributaries of Suisun Bay.)

Charts 18658, 18652.–The site of the **Concord U.S. Naval Weapons Station** is on the S side of the bay. The waterfront along the station is restricted and closed to navigation. (See 207.640 (n), chapter 2, for limits and regulations of the **restricted area.**)

Charts 18656, 18652.–Two adjacent small-craft basins are on the S side of the flats about 1.6 miles E of **Middle Point,** the E boundary of the Navy weapons station. The basins are connected to the bay by twin canals cut through the flats. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18659, 18661, 18652.–Pittsburg, on the S side of New York Slough 12 miles E of Suisun Point bridges, is a manufacturing city with several deepwater berths.

The PGE-Pittsburg Fuel Pier, about 0.3 mile W of **New York Point** , is an offshore wharf with 700 feet of berthing space, 35 feet alongside, and a deck height of 15 feet. It is used for receiving and transshipping petroleum products.

The Diablo Service Corp. Wharf, about 0.6 mile E of New York Point, is an offshore wharf with 875 feet of berthing space with dolphins, 35 feet alongside, and deck height of 12 feet. There are a conveyor system and crawler tractors. Rail and highway connections, and water and electrical shore power connections are available. It is owned by Phillips Petroleum Co. and is used for the receipt of sand and caustic soda, and the shipment of petroleum coke.

The U.S. Steel Corp. Wharf, about 1.3 mile E of New York Point, is a 600-foot marginal wharf with depths of 33 feet alongside and a deck height of 13½ feet. Cranes up to 25 tons are available, and there are rail and highway connections, and water and electrical shore power connections. It is used for the receipt of steel products.

The Dow Marine Dock, about 2 miles E of New York Point, is an offshore wharf with 265 feet of berthing space with dolphins, 40 feet alongside and a deck height of 20 feet. It is used for shipment and receipt of chemical products.

Antioch, on the S side of San Joaquin River 16 miles E of Suisun Point bridges, is a manufacturing city with waterborne commerce. The Kaiser Gypsum Co. Pier, about 38°00′56″N., 121°47′08″W., is a 196-foot offshore wharf, 780 feet usable with dolphins, with 28 feet alongside and a deck height of 11 feet. A conveyor system is available for the receipt of gypsum rock. Highway connections, and water and electrical shore power connections are available.

The Crown Zellerbach Pier, about 0.5 mile E of Kaiser Gypsum Co. Pier, is a 291-foot offshore wharf, 766 feet usable with dolphins, with depths of 38 feet alongside. Receipt of fuel oil for plant consumption. Water is available.

There are also barge facilities at Antioch.

The Fulton Shipyard, on the E edge of the city, has a marine railway that can haul out vessels up to 300 tons for general repairs. The yard builds and repairs auxiliary vessels such as towboats and barges; it is the only repair facility for vessels of this size above Richmond.

Several small-craft facilities are at Pittsburg and Antioch. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18661, 18662.–The **Delta Region,** the combined deltas of the San Joaquin and Sacramento Rivers, comprises the feeder rivers, sloughs, and canals that directly or indirectly connect with one or both of the rivers. Hundreds of miles of navigable waterways for small boats are available in the Delta; both local and visiting small craft use these waterways extensively. Common types of pleasure craft peculiar to the Delta include pontoon boats and houseboats, but many conventional powerboats and sailboats use these waters also, especially in summer when San Francisco Bay is foggy and choppy. Some of the more important sloughs are used by tugs and barges.

Bordering the various waterways are levees which are 12 feet or more higher than the land behind them. The levees are built up from dredged material taken from the adjacent waterway, and because of the settlement of the levees, dredging has been done periodically to keep the tops at height and grade. As material is needed for levee work, the dredge pays more attention to the requirements of the levee than to the depth of the channel for navigation purposes. This leaves an uneven bottom. The tops of the levees generally have dirt roads. **Tule** is often found on the channel side of the levees. Tule is the name given to a tall aquatic plant growth similar to bulrush.

Many public and private small-boat harbors, marinas, and boating resorts are spread over the Delta region. All types of facilities and services for small craft are available, though some areas in the Delta are much more developed than others. Groceries are one of the most difficult items to obtain in this region; groceries in any quantity must be obtained from the larger towns on the Sacramento River, at Antioch or Stockton on the San Joaquin River, or at one of the larger resorts. Diesel oil is similarly rather scarce, since most craft on these waters use gasoline. Diesel oil may be obtained at the junction of the Mokelumne and San Joaquin Rivers, on the W side of King Island, at or near the cities of Antioch and Stockton, and at Bethel Island.

Some areas in the Delta in which small-craft facilities are especially concentrated are: most of the perimeter of **Bethel Island (Bethel Tract),** 3.4 miles E from Antioch Bridge; the S side of San Joaquin River on both sides of Antioch Bridge; the W side of the Mokelumne River from its junction with the San Joaquin River to Georgiana Slough; and the San Joaquin River from Fourteenmile Slough through Stockton. (See the small-craft facilities tabulation on charts 18661 and 18662 for services and supplies available at the small-craft facilities in the Delta Region.)

Cable ferries.–The Sacramento and San Joaquin Rivers, including some of the feeder rivers, sloughs, and canals that directly or indirectly connect with one or both of the rivers, are crossed by cable ferries (see charts 18661 and 18662). These ferries in the delta region are guided by cables and sometimes propelled by a cable rig attached to the shore. Cables to the ferries, which extend from both banks of the waterway, may be at, near, or above the water surface. Operating procedures vary and mariners are advised to use extreme caution and seek local knowledge. In 1978, the U.S. Coast Guard advised that cable ferries were not operating in many charted locations in the delta region. These ferries may operate intermittently, so caution is advised while operating in their vicinity. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Bridge clearances on the Sacramento River above Rio Vista and on other waterways in the delta region are at low water, which is **mean lower low water at low-river stage;** power cable clearances are at high water.

Chart 18661.–San Joaquin River rises in the Sierra Nevada, flows 275 miles in a W direction, and enters Suisun Bay through **New York Slough.** The winding river is navigable for deep-draft vessels to Stockton. The water is generally fresh at Antioch. The mean range of tide is about 3 feet from the entrance to Stockton. Major floods in the river valley may occur from November to April, caused by intense general storms of several days' duration. At the mouth of the river an ordinary flood will cause a rise of 8 feet and an extreme flood a rise of 10 feet in the river level. At Stockton, ordinary flood will cause a rise of 8.5 feet, and extreme flood a rise of 13.5 feet in the river level. The delta of the river is formed of many marshy islands intersected by sloughs and channels. The islands are reclaimed tule and cattail marshes which have been converted to agriculture. Bordering the river are levees that are 12 feet or more higher than the land behind them.

Reports of gage heights of the San Joaquin River delta can be obtained from the Sacramento National Weather Service Office at any time. The information is published in the Sacramento Bee and, in addition, is reported on radio broadcasts from station KFBK whenever the gage heights are sufficient to be of general interest.

Information on gage heights can also be obtained from the State Department of Public Works, Division of Water Resources, Public Works Building, Sacramento.

A Federal project provides for a 30-foot channel from the mouth of the San Joaquin River to a turning basin at Stockton, and for suitable passing and turning basins. (See Notices to Mariners and latest edition of charts for controlling depths.) The 1978 Corps of Engineers project maps show the following controlling depths in the other channels at Stockton: 22 feet from turning basin to Edison Street, thence 9 feet to the head of navigation at Center Street; 9 feet in Fremont Channel and McLeod Lake; 9 feet in Mormon Channel to Main Street, and thence 6 feet to the head of navigation at Washington Street. The sounding datum is **mean lower low water at low-river stage.**

General and explosives anchorages are in the San Joaquin River. (See 110.1 and 110.224 (e) and (g), chapter 2, for limits and regulations.)

(See 162.205, chapter 2, for rules and regulations governing maximum speed, passing, right-of-way, collision, and wrecks in the San Joaquin River.)

Antioch Bridge, a fixed highway bridge with a clearance of 142 feet, crosses San Joaquin River about 3 miles E of Antioch. There are no other bridges over the main channel below the turning basin at Stockton. Power cables over the main channel of San Joaquin River from the mouth to the turning basin at Stockton have a minimum clearance of 125 feet.

There are small-craft facilities on the S side of San Joaquin River on both sides of Antioch Bridge. (See the small-craft facilities tabulation on chart 18661 for services and supplies available.)

The main channel in San Joaquin River to Stockton is marked by a daybeacon, buoys, lights, and lighted ranges. At **Mandeville Cut** and **Venice Cut,** 15 miles above Antioch Bridge, the river still follows its old channel and violent sheers are experienced if the navigator is not prepared to meet the river current when passing from the cuts into the river and from the river into the relatively quiet waters of the dredged channel. Under freshet conditions, vessels tend to sheer off course at the junction of the San Joaquin River and the main ship channel at Channel Point near Stockton.

A reserve fleet at the Stockton Annex, Naval Supply Center, is on the S side of the ship channel between the junctions with Calaveras River and with Smith Canal. These moored ships restrict the channel for large vessels, and caution must be exercised in navigating this section of the river.

Stockton, 28 miles above Antioch Bridge, is in the center of the fertile San Joaquin Valley. The deep-draft harbor is near the W city limits.

Bridges.–A fixed highway bridge with a clearance of 45 feet crosses the upper Stockton channel about 500 yards E of the turning basin.

Tides and currents.–The mean range of tide is 3.1 feet, and the tidal current is negligible.

Weather.–Stockton, the county seat of San Joaquin County, is near the center of the Great Central Valley of California, on the SE corner of the broad delta formed by the confluence of the San Joaquin and Sacramento Rivers. The surrounding terrain is flat, irrigated farm-and orchard-land, near sea level, with the rivers and canals of the delta controlled by a system of levees.

About 25 miles E and NE of Stockton lie the foothills of the Sierra Nevada, rising gradually to an elevation of about 1,000 feet. Beyond the foothills, the mountains rise abruptly to the crest of the Sierra, at a distance of about 75 miles, with some peaks here exceeding 9,000 feet in elevation. On a few days during the year, when atmospheric conditions are favorable, the "downslope" effect of a N or NE wind can bring unseasonably dry weather to the delta area; but on the whole the Sierra Nevada has little or no effect on the weather of San Joaquin County. The Sierra Nevada does affect the area, however, to the extent that the entire economy of the Great Valley depends upon the underground water supplies and rivers which are fed in summer by the melting snows which have piled up during the winter on the windward (W) slopes of the mountains.

To the W and SW, the Coast Range, with peaks above 2,000 feet, form a barrier separating the Great Valley from the marine air, which dominates the climate of the coastal communities. Several gaps in the Coast Range in the San Francisco Bay Area, however, permit the passage inland of a sea breeze which fans out into the delta and has a moderating effect on summer heat, with the result that Stockton enjoys slightly cooler summer days than communities in the upper San Joaquin and Sacramento Valleys.

Stockton's climate is characterized in summer by warm, dry days and relatively cool nights, with clear skies and no rainfall; and in winter by mild temperatures and relatively light rains, with frequent heavy fogs.

The annual rainfall averages between 13 and 14 inches, with 90 percent of this precipitation falling in the winter-half year, i.e., November through April. Thunderstorms are infrequent, occurring on 3 or 4 days a year, generally in the spring, and occasionally in summer, although rainfall with summer thunderstorms is negligible. Measurable rain can be expected on about 52 days a year, and rain exceeding 0.5 inch on about 9 days a year. Since the Pacific storms that bring rainfall to this area are associated with above-freezing temperatures at sea-level elevations, snowfall is practically unknown in the Stockton area.

In summer, temperatures exceeding 100°F can be expected on 6 days in July and about 14 days during the entire summer. During these hot afternoons the air is extremely dry, with relative humidities running generally less than 20 percent. Even on these hot days, however, temperatures will fall into the low sixties at night. In winter the nighttime temperature on clear nights will fall to, or slightly below, freezing, and will rise in the afternoon into the low fifties.

In late autumn and early winter, clear still nights give rise to the formation of dense fogs, which normally settle in during the night and burn off sometime during the day. In December and January, the so-called fog season, under stagnant atmospheric conditions the fog may last for as long as 4 or 5 weeks, with only brief and temporary periods of clearing.

Pilotage.–River pilots, commissioned by the Port of Stockton, are obtained by ship's agents or through the office of the Port of Stockton.

Towage.–It has not been necessary for towage companies to operate at this port because all vessels operate under their own power; however, tugs up to 1,200 hp are available.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Wharves.–Deep-draft facilities at the Port of Stockton are alongside the S side of the upper Stockton Channel from the junction with the San Joaquin River E to the turning basin. The facilities have highway connections and are served by the port's beltline railroad, which connects with three major railroads. Warehouse facilities are available in the port, and the wharves have water and electrical shore power connections. General cargo is usually handled by ship's tackle; special handing equipment, if available, is mentioned in the description of the particular facility. Rental cranes are available locally, and floating cranes for heavy lifts can be obtained from San Francisco. The wharf operator, unless otherwise stated, is the Stockton Port District. Depths alongside are reported; for information on the latest depths contact the Stockton Port District. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 32, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Bulk Material Wharf, Berths 12 and 13 (37°57'02"N., 121°20'05"W.): at Channel Point; 566-foot offshore wharf; 35 feet alongside; deck height, 13½ feet; loading tower served by conveyor system, loading rate 600 tons per hour; shipment of bulk products, receipt of petroleum products and molasses.

Container Terminal Wharf, Berths 10 and 11: just E of Channel Point; 812-foot marginal wharf, 1,010 feet usable with dolphins; 32 feet alongside; deck height, 15½ feet.

General Cargo Wharf, Berth 9: E of and in line with Container Terminal Wharf; 645-foot marginal wharf; 32 feet alongside; deck height, 15½ feet; 56,800 square feet covered storage; forklift trucks.

Wharf 8: S part of E side of Slip 1, which is about 0.3 mile E of Channel Point; wharf and trestle extension 484 feet long; 32 feet alongside; deck height 15½ feet; 36,150 square feet covered storage;

forklift trucks; receipt and shipment of general cargo, shipment of wine by tanker, receipt of molasses.

Wharf 7: immediately N and in line with Wharf 8: 516 feet long; 32 feet alongside; deck height, 15½ feet; 25,100 square feet covered storage; forklift trucks; receipt and shipment of general cargo.

Wharf 6: immediately E of entrance to Slip 1; 418-foot marginal wharf; 32 feet alongside; deck height, 15½ feet; 17,650 square feet covered storage; forklift trucks; receipt and shipment of general cargo.

Wharf 5: E of and in line with Wharf 6; 428-foot marginal wharf; 32 feet alongside; deck height, 15½ feet; 41,000 square feet covered storage; forklift trucks; receipt and shipment of general cargo.

Wharf 4: E of and in line with Wharf 5; 461-foot marginal wharf; 32 feet alongside; deck height, 15½ feet; 41,300 square feet covered storage; 40,000-long-ton capacity bulk storage warehouse; conveyor system, loading rate 400 tons per hour, discharge rate 600 tons per hour; receipt and shipment of general cargo, receipt of bulk phosphate, shipment of bulk fertilizer.

Wharf 3: E of and in line with Wharf 4; 461-foot marginal wharf; 32 feet alongside; deck height, 15½ feet; 41,000 square feet covered storage; forklift trucks; receipt and shipment of general cargo.

Wharves 6, 5, 4, and 3 can provide 1,769 continuous feet of berthing.

Open Wharf 2: SW corner of turning basin; 506-foot marginal wharf; 32 feet alongside; deck height, 15½ feet; two 30-ton gantry cranes; 39,000 feet open storage on wharf; receipt and shipment of general cargo; shipment of logs.

Stockton Elevators Main Wharf: S side of turning basin, just E of Open Wharf 2; 564-foot marginal wharf; 35 feet alongside; deck height, 15½ feet; unloader consists of a receiving hopper and a conveyor which connects to grain elevator; loader consists of two towers, each with a movable spout, interconnected and also connecting to the grain elevator, combined loading rate of 800 short tons per hour; grain elevator back of wharf has capacity of over 5.5 million bushels; shipment of grain by ship and barge, receipt of grain by self-unloading barges; owned and operated by Continental Grain Co.

Supplies may be had in any quantity, and water is piped to the wharves. Ships may fuel from barges; alongside bunkering of large vessels may be done at the oil terminals in San Pablo Bay and Carquinez Strait.

Repairs.–Some dockside facilities are available here, but major repairs to oceangoing vessels must be done at the drydocks in San Francisco, Oakland, Alameda, and Richmond. Several facilities make repairs to small craft; marine railways up to 200-ton capacity are available.

Small-craft facilities.–Several small-craft facilities are at Stockton or nearby. (See the small-craft facilities tabulation on chart 18661 for services and supplies available.)

San Joaquin River above Stockton.–From its junction with Stockton Channel, the river has a controlling depth of about 3 feet for 70 miles to Hills Ferry, and is used only by small pleasure craft, fishermen, and an occasional small barge. The only facilities available are those dispensing gasoline, lubricants, and water at a few points. Navigation above the Southern Pacific Railroad bridge near Lathrop, 14 miles above Stockton, is impracticable in the low stages after June. The river is tidal as far as Mossdale, 15 miles above Stockton. At the San Joaquin Bridge, 28 miles above Stockton, the ordinary flood range is 17 feet and the extreme flood is 21 feet. At Hills Ferry the ordinary flood is 12 feet and extreme flood is 16 feet.

Bridges.–More than 15 bridges cross San Joaquin River between Stockton and Hills Ferry. (See 117.1b, 117.710, and 117.714 (a) and (b), chapter 2, for drawbridge regulations and opening signals.) The drawbridges have a least clearance of 17 feet, and the fixed bridges a least clearance of 21 feet at low water, which is **mean lower low water at low-river stage.** The first fixed bridge is 28 miles above the junction with Stockton Channel.

Charts 18661, 18662.–The principal tributaries of the San Joaquin River are described as the river is ascended. Bridge clearances are at low water. (See 117.710 and 117.714 (c) through (j) for drawbridge regulations and opening signals.)

Threemile Slough, meets the San Joaquin River 5.8 miles above Antioch Bridge and joins the Sacramento River at the N end of **Decker Island.** The slough is a route frequently used by tugs and barges making passage between Sacramento and Stockton. Near the junction with the Sacramento River is a highway lift bridge with clearances of 16 feet down and 110 feet up at low water. The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KMJ-385, Threemile Slough Bridge. The power cable E of the bridge has a clearance of 108 feet.

A **measured course,** 6,057 feet long, is in Threemile Slough. The orange-color markers are on the W bank of the slough about 0.5 mile and 1.5 miles N, respectively, of the junction with San Joaquin River.

Mokelumne River, one of the principal tributaries of the San Joaquin River, rises in the Sierra Nevada and empties into it 11.8 miles above Antioch Bridge. The river separates, 3.5 miles above its mouth, into two branches, the **North Mokelumne River (North Fork)** and the **South Mokelumne River (South Fork).** The branches continue in a N direction and rejoin 9 miles NNE from the mouth. The river then describes a semicircular route for 7 miles to the N and E to the head of navigation at the Galt-New Hope Bridge.

Corps of Engineers project maps for 1978 show the following controlling depths for Mokelumne River: 12 feet from the mouth to the lower junction of the North and South Mokelumne Rivers, thence 7 feet by North Mokelumne River to Snodgrass Slough; thence 2 feet to upper junction of the North and South Mokelumne Rivers; 7 feet from the lower junction by South Mokelumne River to the upper junction; and thence 2 feet to the Galt-New Hope bridge. Mokelumne River is subject to shoaling; local knowledge is advised.

(See 117.1b, 117.710, and 117.714 (f), chapter 2, for drawbridge regulations and opening signals for the swing and removable span bridges crossing Mokelumne River between the entrance and Galt-New Hope fixed bridge at Thornton.) The minimum clearance of the drawbridges is 11 feet. The Mokelumne River highway swing bridge just S of the junction with Georgiana Slough is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KMJ-382, Mokelumne River Bridge. Power cables have a minimum clearance of 110 feet. The Galt-New Hope Bridge has a fixed span with clearances of 18 feet at low water and 2 feet at high water.

Twin fixed highway bridges about 3.5 miles above the upper junction of North and South Mokelumne Rivers have a clearance of 24 feet at low water and 5 feet at high water.

The mean range of **tide** in Mokelumne River at the entrance to Georgiana Slough is 2.6 feet; the diurnal range of tide is 3.5 feet. At Galt-New Hope Bridge, during low river stages, the mean range of tide is 2.7 feet; the diurnal range is 3.6 feet.

Georgiana Slough enters Mokelumne River about 3 miles above the mouth, and connects that river with the Sacramento River at Walnut Grove. The controlling depth through the slough is about 13 feet. Tugs and barges formerly used the slough in making the run from Sacramento to Stockton, but to avoid the snags and sharp turns they now favor the route through Threemile Slough.

The minimum clearance of the drawbridges crossing Georgiana Slough is 15 feet. (See 117.1b, 117.710, and 117.715, chapter 2, for drawbridge regulations and opening signals.)

Old River flows into the San Joaquin River about 13 miles above the Antioch Bridge after diverging from the latter river about 38 miles above the bridge. It is the most W branch of the interconnecting tidal channels into which San Joaquin River divides in crossing its delta. Old River has many sloughs and canals that connect with Middle River to the E.

Corps of Engineers project maps for 1978 show that the controlling depths in Old River were: 10 feet for 10 miles from the mouth to Orwood; thence 10 feet for 9 miles to the lower end of Grant Line Canal; thence 7 feet for 9 miles to the Holly Sugar Factory near Tracy; and from the other end of Grant Line Canal to the head of Old River in San Joaquin River, 5 feet.

The minimum clearances of the bridges crossing Old River are: drawbridges, 10 feet; fixed bridges, 18 feet. Power cables as far as Orwood have a minimum clearance of 110 feet.

The mean range of **tide** at Orwood on Old River is 2.8 feet, and the diurnal range is 3.7 feet; ordinary flood fluctuations are 15 feet and 5½ feet, respectively, and extreme flood fluctuations are 19 feet and 8 feet, respectively.

The Atchison, Topeka, and Sante Fe Railway has a warehouse and wharf at Orwood for transfer of farm produce from boat to rail. The Phillips cannery at Orwood has similar facilities. The Holly Sugar Co. refinery and terminal near Tracy has a large wharf and an unloading basin; a passing basin is about 0.5 mile downstream from the terminal.

Middle River enters the San Joaquin River 15.3 miles above Antioch Bridge. The river and connecting channels are a part of a complicated network of tidal canals, some natural and some artificial, in the delta of the San Joaquin River. One of the principal channels, Middle River leaves Old River at the SW corner of Roberts Island about 7 miles SSW of Stockton and roughly parallels Old River to the San Joaquin River.

The controlling depth in Middle River is about 6 feet to the Bacon Island Road swing bridge, about 15.5 miles below the junction with Old River. the channel is not maintained above the bridge, and navigation is obstructed by many snags and shoals.

The least clearance of the bascule and swing bridges across Middle River is 12 feet at low water; three fixed bridges 1 mile, 4 miles, and 8.5 miles below the junction with Old River have a least clearance of 12 feet at high water and a least width of 24 feet. (See 117.1b, 117.710, and 117.714(c), chapter 2, for drawbridge regulations and opening signals.) Power cables crossing the river have a minimum clearance of 70 feet.

Cable ferry.–Woodward Island Ferry crosses Middle River about 12.5 miles below the junction with Old River. The ferry carries passengers and vehicles, and operates from 0800 to 1700 daily. White warning signs, with black letters and orange borders, are posted about 500 feet on either side of the ferry crossing. Flashing red beacons are shown by the ferry when underway. When the ferry is underway, the cables are 6 to 7 feet above the water surface; when docked, the cables are on or within 1 or 2 feet of the bottom. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Empire Cut enters Middle River about 16.5 miles below the latter's junction with Old River.

Cable ferry.–Mildred Island Ferry crosses Empire Cut about 0.6 mile E of the junction with Middle River. This private cable ferry carries passengers, vehicles and farm equipment, and operates during daylight hours. When the ferry is underway, the cables are suspended at an unknown depth below the water surface; when docked, the cables are dropped to the bottom. A sign on each side of the ferry warns of the cables; a flashing red signal is shown when underway. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

The mean range of **tide** at the Bacon Island Road swing bridge on Middle River is 2.6 feet, and the diurnal range is 3.5 feet.

A large wharf with warehouse and rail connection is at the town of **Middle River,** 8.5 miles above the mouth. Gasoline and fishing supplies are available for small craft at Middle River.

Little Connection Slough enters the San Joaquin River about 1 mile above the mouth of Middle River.

Cable ferry.–Venice Island Ferry crosses Little Connection Slough about 1 mile above the entrance. The ferry carries passengers and vehicles and operates from 0800 to 1700 daily. White warning signs, with black letters and orange borders, are posted about 500 feet on either side of the ferry crossing. Flashing red beacons are shown by the ferry when underway. When the ferry is underway, the cables are 6 to 7 feet above the water surface; when docked, the cables are dropped to the bottom. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Turner Cut enters the San Joaquin River about 7.5 miles below Stockton.

Cable ferry.–McDonald Island Ferry crosses Turner Cut about 1.8 miles above the entrance. The ferry carries passengers and vehicles, and operates from 0800 to 1700 daily. White warning signs, with black letters and orange borders, are posted about 500 feet on either side of the ferry crossing. Flashing red beacons are shown by the ferry when underway. When the ferry is underway, the cables are 6 to 7 feet above the water surface; when docked, the cables are on or within 1 or 2 feet of the bottom. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Sacramento River rises in the Trinity Mountains in N central California, flows S for 325 miles, and enters Suisun Bay on the N side of **Sherman Island.** Deep-draft vessels follow the lower Sacramento River to Cache Slough, 1.5 miles above Rio Vista Bridge, thence through a deepwater ship channel to Sacramento, a distance of 37 miles above the mouth of the river. Barges and other small craft also use Sacramento River all the way to Sacramento, a distance of 50 miles. Above Sacramento, small craft go to Colusa, 125 miles above the mouth, but there is no regular navigation above this point.

Cable ferry.–A cable ferry crosses **Cache Slough** about 5.6 miles above Rio Vista Bridge. The ferry carries passengers and vehicles, and operates from 0800 to 1630 daily except Saturdays, Sundays, and holidays. When the ferry is underway, the cable is suspended below the water surface at varying depths. When the ferry is docked, the cable is about 14 feet below the water surface at the centerline of the slough decreasing to lesser depths at the banks. Buoys about 100 yards upstream and downstream of the ferry crossing mark a 5 mph **speed zone.** A sign on each side of the ferry warns of the cable; a flashing red beacon is shown when underway. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Steamboat Slough enters Cache Slough about 1.8 miles above Rio Vista bridge.

Cable ferry.–Steamboat Slough Ferry crosses Steamboat Slough about 5 miles above the junction with Cache Slough. The ferry carries passengers and vehicles, and operates 24 hours daily. When the ferry is underway, the cable is suspended below the water surface at varying depths. When the ferry is docked, the cable is about 11 feet below the surface at the centerline of the slough decreasing to lesser depths toward the banks. Warning signs are posted at the crossing. When underway, the ferry shows flashing red lights. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Channels.–Sacramento River Deep Water Ship Channel extends from Suisun Bay through lower Sacramento River, Cache Slough, and a 22-mile land cut to a triangular harbor and turning basin at the Port of Sacramento. A barge canal with navigation lock connects the channel with the Sacramento River at Sacramento. Project dimensions follow: ship channel, 30 feet deep, 200 to 300 feet wide; barge canal, 13 feet deep, 120 feet wide; navigation lock, usable length of 600 feet, 86 feet wide, 13 feet deep. (See 207.640 (q), chapter 2, for navigation regulations for the navigation lock and for the deepwater ship canal.)

In addition to the regulations for the navigation lock joining the Sacramento River and the Sacramento River Deep Water Ship Channel, the Corps of Engineers, Sacramento District, announced a new schedule for the lock effective July 1, 1973, and as amended by Coast Guard Local Notice to Mariners No. 30 (Twelfth Coast Guard District), dated July 26, 1976, as follows:

a. During the period May 2 through October 31, the lock will be operated from 0600 to 2200 daily.

b. During the period November 1 through May 1, the lock will be operated from 0700 to 1900 daily.

c. On weekdays, throughout the year, those vessels requiring raising of the bascule bridge for clearance will not be given lockage between the hours of 0700 to 0900 and 1600 to 1800.

In addition, special lockage may be arranged during closed periods by giving at least 4 hours' advance notice. This notice can be made by calling the lock during normal hours of operation by telephone (916–371–7540) or by VHF-FM radio on channel 16 (156.80 MHz).

The lock operates for recreational boats on the following schedule: The lock will open for boats entering the port (westbound) on the hour, and for boats entering the river (eastbound) on the half-hour.

The project depth in the ship channel is generally maintained. (See Notice to Mariners and latest editions of charts for controlling depths.) In June 1978, shoaling was reported in the vicinity of Sacramento Bend between the lock and the Sacramento River. The best water, marked by buoys, was reported to be along the south shore. Extreme caution is advised when entering or leaving the lock. The controlling depth in the river route is about 10 feet. Above Sacramento, the controlling depth is about 6 feet to Colusa. The sounding datum is **mean lower low water at low-river stage.**

Numerous uncharted piles, snags, pumps, and pipes, some submerged, may exist along the edges of the river. Mariners are advised to exercise extreme caution while navigating close to the banks of the river.

Bridges.–The vertical lift highway bridge across the Sacramento River Deep Water Ship Channel just above Rio Vista has a clearance of 13 feet down and 138 feet up at high water. The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz) and 18 (156.90 MHz). Call sign: KMJ–384, Rio Vista Bridge. The highway-railroad bascule bridge across the barge canal just W of the lock at Sacramento has a clearance of 8 feet at high water. (See 117.1b and 117.710, chapter 2, for drawspan regulations and opening signals.)

The minimum clearance of the power cables across the lower Sacramento River Deep Water Ship Channel is 125 feet at high water.

Clearances of bridges across the shallow route of the Sacramento River above Rio Vista Bridge are given with the description of the river. (See 117.1b, 117.710, and 117.716, chapter 2, for drawbridge regulations and opening signals.) The bridge clearances above Rio Vista are at low water, which is **mean lower low water during low-river stage;** power cable clearances are at high water.

The minimum clearance of the power cables over the Sacramento River below Sacramento is 110 feet.

Tides and currents.–At low-river stages the mean range of tide is 3.2 feet at the entrance to Sacramento River and 2.3 feet in the river at Sacramento; at other stages the tide is negligible.

Currents in Sacramento River depend on the river stage. During high-river stages, there is little or no flood current and the ebb current is strong to Sacramento. During the dry season a flood current can be carried to Paintersville and from there slack water to Freeport, 30 and 41 miles above the mouth, respectively. At times of extreme low-river stages, flood current may be evident as far as Sacramento. Local knowledge is required to estimate current conditions for a particular time.

Major floods in the Sacramento River valley usually occur from November to April and are generally caused by intense general storms of several days' duration, the runoff from which may be augmented by the melting of snow in the mountains. At the mouth of the river an ordinary flood will cause a rise of 8 feet and an extreme flood a rise of 10 feet in the river level. At Sacramento, ordinary flood will cause a rise in the river level of 20 feet and extreme flood, a rise of 30 feet.

Reports of gage heights of the Sacramento River can be obtained from the Sacramento National Weather Service Office at any time of the year. The information is published in the **Sacramento Bee** and, in addition, is reported on the radio broadcast from station KFBK whenever the gage heights are of sufficient magnitude to be of general interest. Information on gage heights can also be obtained from the State Department of Public Works, Division of Water Resources, Public Works Building, Sacramento.

The upper 20 miles of Sacramento River Deep Water Ship Channel are free of river current and flood waters.

Weather.–The climate of the lower Sacramento Valley is mild, with plenty of sunshine year round. Cloudless skies prevail during the spring, summer, and fall. Winter is the rainy season, with measurable amounts falling on about 10 days per month. Snow is rare, since freezing temperatures are rare. The valley is protected from most severe winter storms by the mountains to the W, N, and E. Sometimes, torrential rains on the slopes can cause flooding along the Sacramento River.

The mountains are responsible for the predominantly S winds throughout the valley. These are oceanic winds that have moved through the Carquinez Strait and been turned N by the Sierra ranges. At the port of Sacramento, SE through SW winds prevail, particularly during spring and summer. NW through N winds are also frequent, and bring warm, dry air down the mountains. These winds cause brief heat waves, with temperatures rising to over 100°F in summer, and they modify cool weather in winter. Strongest winds occur in winter although gales occur less than 1 percent of the time, even in midwinter. Winds of 17 to 28 knots occur 6 to 10 percent of the time from December through March, and less than 5 percent of the time during July, August, and September. Extreme winds have reached 60 knots, with gusts of more than 70 knots; these are most likely during fall or winter.

Dense fog is common in winter, infrequent during spring and fall, and rare in summer. It is a radiation type fog that occurs during the late night and early morning hours. It usually clears by noon. Occasionally stagnant weather conditions will cause the fog to hang on for a few days. Visibilities at Sacramento drop below 0.5 mile on about 5 to 10 nights per month, from November through February. During this same period, they fall below 7 miles on about 10 to 20 occasions per month. During the summer, visibilities are almost always better than 7 miles.

Routes.–The deep-draft channel to the Port of Sacramento through Sacramento River Deep Water Ship Channel is marked with navigational aids.

The shallow-draft route continues in Sacramento River from 1.5 miles above Rio Vista Bridge to Sacramento, and for the most part is marked by leading lights.

From Ida Island for a distance of 3.5 miles upstream there are shifting shoals. After passing Ida Island work gradually over to the W half of the channel and favor that side around the next bend. From this point to Clarksburg the channel is clear, and midchannel courses may be followed favoring the falling tide bends. At Clarksburg favor the E shore a little until just past the town, then swing into midchannel again. From just below Freeport the channel is rather shoal and wing dams have been built at several places to scour out the channel. These are covered at high-water stages and may be struck if the shore is approached too closely. By favoring the ebbtide bends no trouble should be encountered from here to Sacramento.

Note.–Care should be exercised at all times to keep clear of the levees, as most of them are faced with rock which may damage vessels that drag along them.

Pilotage.–River pilots, commissioned by the Port of Sacramento, are arranged for by the ship's agents, but may be obtained through the office of the Port of Sacramento.

Towage.–Tugs up to 1,500 hp are available.

Chart 18661.–Rio Vista, 10.5 miles above the mouth of the Sacramento River, is the most important town, commercially, below Sacramento. Several dredging companies are here. An Army storage area and a Coast Guard station are just S of the town. A small-craft harbor on the S side of the town has gasoline, water, and berths available. A lift here can handle craft up to 40 feet for hull and engine repairs.

Ida Island, on the S bank 13.5 miles above the mouth of the river, is the site of a resort and small-boat basin. Gasoline, water, and moorage are available. A marine railway can handle craft up to 35 feet for minor hull work.

Isleton, on the S bank 15 miles above the mouth of the river, has an inactive landing formerly used for oil barge traffic. Gasoline and some supplies are available in town. A highway bridge with a double-bascule span across the river 0.7 mile above Isleton has a clearance of 18 feet. (See 117.1b and 117.710, chapter 2, for drawbridge regulations and opening signals.) The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KMJ–383, Isleton Bridge.

Chart 18662.–Walnut Grove, 24 miles above the mouth of Sacramento River, is at the junction with Georgiana Slough. Gasoline, and marine supplies may be obtained in moderate quantities. The river is crossed here by a highway bridge with a double-bascule span having a clearance of 24 feet. (See 117.1b, 117.710, and 117.716 (a)(1), chapter 2, for drawbridge regulations and opening signals.) The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KMJ–491, Walnut Grove Bridge. A marina is on **Snodgrass Slough** just SE of Walnut Grove. Gasoline, water, and berths are available. The slough connects with North Mokelumne River.

A wharf and a large wooden shed are on the E side of the river 1.2 miles above Walnut Grove; gasoline and some repair work is available. A **measured nautical mile** along the NE side of the river begins 1.2 miles above Walnut Grove. A resort is at the junction of Steamboat Slough with the river. Gasoline, water, and moorage, are available. Five miles above Walnut Grove at the small village of **Paintersville,** a highway bridge with a double-bascule span across the river has a clearance of 24 feet. (See 117.1b, 117.710, and 117.716 (a)(1), chapter 2, for drawbridge regulations and opening signals.) The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KMJ–381, Paintersville Bridge.

Courtland, 31 miles above the mouth of the river, has supplies in moderate quantities; gasoline, oil, water, and ice are available.

At **Clarksburg,** 37.5 miles above the mouth of the river, there are two abandoned oil company landings. Gasoline and some marine supplies are available at a small-craft landing.

Freeport, 41.5 miles above the mouth of the river, has gasoline. The highway bascule bridge at Freeport has a clearance of 30 feet. The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KMJ–490, Freeport Bridge.

Three bridges cross at Sacramento. A fixed highway bridge 0.6 mile above the junction with the barge canal has a vertical clearance of 84 feet. The Tower Bridge at Capitol Avenue, 1.3 miles above the junction, is a railway and highway vertical-lift bridge with a clearance of 38 feet down and 128 feet up. The bridge is equipped with VHF-FM channels 9 (156.45 MHz), working frequency, and 10 (156.50 MHz), 13 (156.65 MHz), 16 (156.80 MHz), and 18 (156.90 MHz). Call sign: KDO–739, Tower Bridge. The Eye Street Bridge 0.5 miles N of Tower Bridge is a railway and highway swing bridge with a clearance of 33 feet; the nearby overhead power cable has a clearance of 74 feet over the W draw and 80 feet over the E draw at high water. (See 117.1b, 117.710 and 117.716 (a)(2), chapter 2, for drawbridge regulations and opening signals.)

A paved highway between Antioch and Sacramento runs along the levee of the river for nearly its entire distance.

Sacramento, the State capital, is the head of navigation for most of the shipping on the river, and is a distribution and transportation center for N California and parts of Nevada and Oregon. The **Port of Sacramento,** at the head of the deepwater channel, is an important point for interchange of cargo between rail, highway, and water transportation.

Weather.–The lower Sacramento Valley, where Sacramento is located, enjoys a mild climate and abundance of sunshine the year round. Cloudless skies prevail during the summer and largely in the spring and autumn. The summers are remarkably dry, with warm days and pleasant nights. In the winter "rainy season" (December, January, and February) over one-half of the total annual precipitation falls, yet rain in measurable amounts occurs only on about 10 days monthly during winter. Mountains surround the valley to the W, N, and E. The Sierra Nevada snow fields are only 70 miles E of Sacramento and usually provide a plentiful supply of water in the valley streams during the dry season. Because of the shielding influence of the high mountains around the valley, winter storms reach valley districts in modified form. However, torrential rain and heavy snow frequently fall on the western Sierra slopes, the southern Cascades, and to a lesser extent the Coastal Range. As a result, flood conditions occasionally occur along the Sacramento River and its tributaries. Excessive rainfall and damaging windstorms are rare in the valley.

Prevailing winds at Sacramento are S all year, due to the N-S direction of the valley and the deflecting effect of the towering Sierra Ranges on the prevailing oceanic winds that move through the Carquinez Strait at the junction of the Sacramento and San Joaquin Rivers. No other tidewater gap exists in the coastal mountains to admit marine air into the Sacramento or the San Joaquin Valley. Occasionally a steep northerly barometric pressure gradient develops and air is forced over the Siskiyou Mountains to the N, warmed dynamically with descent, and reaches the valley floor as a warm, dry, N wind. These occasionally disagreeable winds, known as "northers" in the valley, are the counterpart of the well-known "chinook" winds of the Rocky Mountains, and they, or modifications of them, produce the pronounced heat waves in summer. Fortunately, they are of infrequent occurrence and produce an unstable atmospheric condition that is usually followed within 2 or 3 days by the normally cool S breezes, especially at night. Summer nights in the lower Sacramento Valley are, with few exceptions, cool and invigorating, the result of a prevailing oceanic influence. While it is true that "northers" cause dry, hot weather for brief periods during the summer, it is equally true they are the modifications of cold waves in the winter. Winter northers, with only a few exceptions, are comparatively warm, drying winds.

Thunderstorms are few in number and usually mild. Snow falls so rarely, and in such small amounts, that its occurrence may be disregarded as a climatic feature. Heavy fog occurs mostly in midwinter, never in summer, and seldom in spring or autumn. Light and moderate fog are more frequent and may come anytime during the wet, cold season. The fog is usually the radiational cooling type, and confined to the early morning hours. An occasional winter fog, under stagnant atmospheric conditions, may continue for several days.

(See page T-4 for **Sacramento climatological table.**)

Pilotage and **Towage** were discussed with Sacramento River earlier in this chapter.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard.–A Coast Guard air station is NE of Sacramento at McClellan Air Force Base.

Harbor regulations.–Copies of the harbor regulations are available from the Port of Sacramento whose office is in the World Trade Center, West Sacramento, Calif. 95691.

The port radio station KPB-386 VHF-FM channel 18 (156.90 MHz) is monitored 24 hours a day.

Wharves.–The deepwater facilities of the Port of Sacramento consist of three wharves and three piers, each of which has a berthing length of 600 feet with a deck height of 22 feet and reported depths alongside of 30 feet or more. All berths are served by railroad and highway connections, and all berths have water and electrical shore power connections. General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. All of these facilities are owned and operated by the Sacramento-Yolo Port District. Several small wharves and piers along the shallower Sacramento River, privately owned or owned by the city of Sacramento, are operated by oil companies, a rice growers association, a tug company, and a cement company. These facilities are used for shipping various commodities by barge, for fueling small craft, and for mooring small vessels and floating equipment. For a complete description of the port facilities refer to Port Series No. 32, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

The port wharves and piers along the NE side of the turning basin are described from W to E.

Pier 8 (bulk handling) (38°33'57"N., 121°33'00"W.): 75,000 tons covered storage and 650,000 tons open storage; conveyors with loading rate of 600 tons per hour extend from wharf to storage and from storage to rail and truck loading points.

Wharf 7: general cargo; one transit shed with a total cargo floor area of over 86,000 square feet; two gantry cranes. (See description of Wharf 6.)

Wharf 6: general cargo, bulk commodities, and containers; 6 acre open paved storage area; two traveling, revolving gantry cranes, each with a 110-foot boom and a capacity of 45 tons at a reach of 40 feet, serve Wharves 6 and 7.

Pier 5 (bulk grain and feed berth): shipment of grain, including bulk milled rice; grain elevator of 30,000 ton capacity connected by conveyor to ship loader on wharf, loading rate 600 tons per hour.

Wharf 2: general cargo; over 126,000 square feet of cargo floor area.

Pier 1: bulk rice received by barge and shipped by vessel; conveyor extends from wharf to 22,000-ton storage facility, loading rate 600 tons per hour; rice received by self-unloading barges that berth at back face of the pier.

Supplies.–Provisions are available in any quantity. Some marine supplies may be obtained. Fuel oil may be obtained by tank truck or barge. Ships do not normally take on fuel or provisions in Sacramento.

Repairs.–There are no repair facilities for large oceangoing vessels in Sacramento; the nearest shipyards with large drydocks are at Richmond, Oakland, Alameda, and San Francisco. A tug company in Sacramento has a marine railway for repairing company vessels; other craft may be hauled out on the ways if company requirements permit. Vessels to about 130 tons can be hauled out for minor repairs and engine work.

Small-craft facilities.–There are several small-craft facilities along the Sacramento River at Sacramento. (See the small-craft facilities tabulation on chart 18662 for services and supplies available.)

Communications.–Sacramento is served by four railroads, several highways, and two airports.

Chart 18664.–Above Sacramento the prevailing flood conditions are as follows: At Verona at the junction of Feather River, 70 miles above the mouth, 20 feet at ordinary floods and 24 feet at extreme floods; at Colusa, 125 miles above the mouth, 25 feet at ordinary floods and 32 feet at extreme floods.

Between Sacramento and Colusa are numerous warehouses and small landings. Freight is also handled on the bank.

The minimum clearance of the swing and bascule span bridges over the Sacramento River between Sacramento and Colusa is 29 feet at low water, and of the fixed bridges 55 feet at high water and 82 feet at low water. (See 117.1b, 117.710 and 117.716 (a)(3), (a)(3a), and (a)(4), chapter 2, for drawbridge regulations and opening signals.) The minimum clearance of the overhead power cables across the river is 60 feet.

Feather River rises in the Sierra Nevada and empties into Sacramento River at **Verona,** 18 miles above Sacramento. The river has been improved by snagging and the construction of wing dams at **Marysville,** 26 miles above the mouth. The controlling depth is usually 3 feet from about February 15 to June 15. Ordinary flood fluctuation is 20 feet, and extreme flood fluctuation is about 25 feet. With the exception of several small privately owned landings, all loading is handled on the banks. There has been no commercial navigation on the Feather River in recent years. A highway bridge with removable span, 8.1 miles above the mouth, has a clearance of 37 feet at low water. The clearance of the fixed highway bridge near Marysville, 24.8 miles above the mouth, is 44 feet at low water.

Chart 18665.–**Lake Tahoe** (39°06'N., 120°00'W.), California-Nevada, is a recreation area almost surrounded by Tahoe, Toiyabe, and Eldorado National Forests. **Restricted areas** established by Federal regulations are given in **162.210** and **162.215,** chapter 2. Information about facilities may be obtained from one of the local offices of the Forest Service, U.S. Department of Agriculture.

Storm warning signals are displayed. (See chart.)

8. SAN FRANCISCO BAY TO POINT ST. GEORGE, CALIFORNIA

Chart 18010.–This chapter describes Bodega Bay, Tomales Bay, Noyo River and Anchorage, Shelter Cove, Humboldt Bay, and numerous other small coves and bays. The only deep-draft harbor is Humboldt Bay, which has the largest city along this section of the coast, Eureka. The other important places, all for small craft, are Bodega Harbor, Noyo River, Shelter Cove, and Crescent City Harbor. The coast is rugged and often mountainous, with many detached rocks. The principal dangers, all marked, are Blunts Reef, Redding Rock, and St. George Reef.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1255 through 80.1275, chapter 2.

Weather.–Winter storms and a strong spring pressure gradient between the subtropical high and the Aleutian Low make these two seasons very windy. Speeds of 20 to 30 knots occur 15 to 20 percent of the time. Gales occur about 5 percent of the time off Point Arena and N of Cape Mendocino. Fronts and storms cause varying wind directions, but since many lows pass well offshore and to the N, winds are often out of a S direction. Strong winds inhibit radiation or winter fog formation. It is most likely S of Eureka in the early morning after a night of clear skies and light winds. At times, this type of fog can plague Humboldt Bay. S winds help keep winter temperatures mild for these latitudes. Daytime highs in the midfifties and nighttime lows around 40°F are common; this compares with highs in the upper thirties and lows in the midtwenties along the East Coast. The storms that pass near or through the area make winter the rainy season. December through January is the height of the season, and precipitation of 0.1 inch or more can be expected on about 10 to 11 days per month S of Cape Mendocino and on up to 20 days to the N. Snow falls occasionally along this N coast.

Winds in spring are more variable than in winter, as the subtropical high builds and the Aleutian Low shrinks. The change takes place gradually from N to S. NW through N winds become more common while S winds are not quite so prevalent. With the decrease in storm activity, rain falls on only about 6 or 7 days per month. Temperatures rise by about 4 or 5°F over winter averages by April. Visibilities are at their best during March and April. The pressure gradient keeps strong winds frequent.

By summer, the high has taken control along this coast. However, S winds continue to occur frequently in the N. NW through N winds are most common and are reinforced by the sea breeze. Wind speeds of 20 to 30 knots occur 10 to 20 percent of the time, attesting to this reinforcement. They are most likely N of Cape Mendocino, where gales occur 5 to 10 percent of the time. These speeds do not inhibit the formation of advection fog, which plagues the area from July through September. Visibilities drop below 1 mile on about 10 to 15 days per month S of Point Delagada and 5 to 10 days per month to the N. Fog signals fill the air 30 to 50 percent of the time during August–the worst month. At coastal stations, visibilities drop below 0.5 mile on 10 to 20 days per month. Fog is particularly dangerous in shoal-ridden Humboldt Bay. Point Reyes and Point Arena are the foggiest spots, while Point St. George appears to be the least foggy. Fog and low stratus often blanket the waters around Point Reyes for weeks at a time, permitting little sunshine. As a result, Point Reyes has close to the lowest average midsummer temperature of any observing site in the United States. In general along the coast, daytime temperatures average in the low to midsixties, while nighttime lows drop into the low fifties. This compares with an average July high of 85°F and a low of 67°F in New York. Rain is of little concern.

Autumn brings a gradual return to winter conditions. Fog becomes less frequent. This is a gradual change in sheltered regions like Humboldt Bay, where radiation fog is likely. Temperatures fall off by 2 or 3°F on the average by October. Winds become a mix of S and N, with N gaining the edge, as fall turns toward winter. Gales are infrequent, and winds blow 20 to 30 knots 10 to 15 percent of the time.

Charts 18640, 18643.–From Point Reyes, the coast trends in a general N direction for 10 miles as a broad white sand beach backed by high grassy sand dunes, and then curves NW for 6 miles in high yellow cliffs, terminating in **Tomales Point.** The large white building at the radio station, 7 miles NE of Point Reyes, is prominent.

The **Point Reyes/Farallon Islands National Marine Sanctuary** has been established to protect and preserve the marine birds and mammals, their habitats, and other natural resources in the waters surrounding the Farallon Islands and Point Reyes, and to ensure the continued availability of the area as a research and recreational resource. The sanctuary encompasses the waters off Bodega Head and Point Reyes, and the waters surrounding Farallon Islands. The sanctuary includes Bodega Bay but not Bodega Harbor. Recreational use of the area is encouraged. Regulations governing the use of the sanctuary are contained in 15 CFR 936. Any person in possession of a valid permit may conduct in the sanctuary the specific activity designated in the permit, including any activity specifically prohibited by the regulations, if such activity is (1) research related to the resources of the sanctuary, (2) to further the educational value of the sanctuary, or (3) for salvage or recovery operations.

Permit applications and requests for copies of the regulations shall be addressed to the Assistant Administrator for Coastal Zone Management, Sanctuary Programs Office, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, NW., Washington, D.C. 20235.

Bodega Bay, a broad opening between Tomales Point and Bodega Head, affords shelter from NW weather at its N end, but is dangerous in S or W weather. The summit of **Bodega Head** is rounding and grassy, with steep rocky cliffs on the S and W ends. Low **Bodega Rock** and foul ground extend from 0.2 to 0.7 mile SE of the S face of Bodega Head.

Bodega Head Light (38°18.0′N., 123°03.2′W.), 110 feet above the water, is shown from a post with a red and white diamond-shaped daymark on the SE end of Bodega Head. A radiobeacon is 0.9 mile NW of the light.

Lighted buoys mark the entrance to Bodega Bay. In good weather small boats having local knowledge sometimes use the passage between Bodega Head and Bodega Rock, but the passage is dangerous during periods of heavy ground swells because of the combers.

COLREGS Demarcation Lines.–The lines established for Bodega and Tomales Bays are described in 80.1255, chapter 2.

Tomales Bay enters the S part of Bodega Bay E of Tomales Point, and extends SE for 12 miles with an average width of 0.5 mile. The channel with depths of 4 to over 10 feet is marked by buoys and daybeacons for about 4 miles to deeper water inside the bay. The entrance bar is dangerous and should not be attempted by strangers. A 6-knot current may be encountered on a spring tide at the entrance to the bay.

The shallow area on the entrance bar frequently becomes rough, and it is reported that the sudden appearance of breakers in a calm sea is common. Because such waves appear with little warning, they are called "sneaker waves." These waves occur primarily during the ebb tide, but the entire bar area can become rough owing to strong afternoon winds. Boatmen should plan to leave the area before the tide turns or be prepared to remain outside until the rough water subsides, or to go to another harbor such as Bodega.

Fish, clams, and oysters are taken from Tomales Bay by commercial and sport fishermen, and moved to San Francisco by truck. Several small-craft repair facilities on the bay can make hull and engine repairs. The largest marine railway can handle vessels up to 60 tons; cranes up to 20 tons are also available. Long piers used by sport fishermen extend out into the bay at several places. Gasoline, diesel fuel, water, marine supplies, and launching ramps are available.

Bodega Harbor, in the N part of Bodega Bay, is an important commercial fishing base and, in season, an active sports fishing and recreation harbor. During salmon season more than 500 fishing craft either anchor just outside in the shelter of the N part of the bay, or inside at berths which ordinarily accommodate about 200 boats.

A dredged channel, protected by entrance jetties, leads from Bodega Bay to the facilities along the N and SE sides of the harbor at the town of **Bodega Bay.** The channel is marked by daybeacons and lights; lighted ranges mark the channel from the entrance to the turning basin at the N end of the harbor. There are three turning basins in the harbor; one just inside the entrance, one at the N end of the harbor, and one near the SE end of the harbor. In September 1979, the controlling depths were 9½ feet to the turning basin just inside the entrance with 5 to 10 feet in the basin, thence 8 feet at midchannel to the turning basin at the N end of the harbor with 10 to 11 feet in the basin, thence 12 feet at midchannel to the turning basin near the SE end of the harbor with 4 to 6 feet in the basin, except for shoaling to 1 foot on the NE side.

Gasoline, diesel fuel, ice, water, and some marine supplies, can be obtained in the harbor. Berths are available at two small marinas; one is N of the turning basin at the N end of the harbor, and the other with a 36-foot marine railway is at the NW side of the harbor. A Coast Guard station is on the E side of the channel, 0.8 mile above the entrance.

Chart 18640.–The coast from Bodega Head for 52 miles to Point Arena trends in a general NW direction. There are some dangers, but they do not extend over a mile offshore, and in thick weather the 30-fathom curve may be followed with safety. In the summer the rocks are generally marked by kelp, which extends in some cases to the 10-fathom curve, but during the winter gales much of the kelp is torn away.

In clear weather the mountains may be readily seen, and at times are visible when the lower land is shut in by haze or fog. In thick weather soundings should be taken frequently, as the currents are extremely irregular both in direction and velocity.

Protection from the prevailing NW winds of summer may be had at several places, but there is no shelter from the winter winds, which are usually accompanied by a heavy W swell.

N of Bodega Head, the cliffs are about 200 feet high for 2 miles, and then are succeeded by a broad sand beach 2 miles long backed by sand dunes 120 feet high. From this point the coast N consists of abrupt rocky cliffs, broken by gulches, to the mouth of the Russian River, 10 miles N of Bodega Head.

Numerous rocks, 20 to 130 feet high, are within 0.3 miles of the shore, but some extend as much as a mile offshore. **Gull Rock,** 100 feet high, is 1.7 miles SE of the mouth of Russian River and 0.3 mile offshore. About 0.5 mile NW of Gull Rock and 400 yards offshore is a large arched rock, 85 feet high, with a flat top. This is the largest arched rock on this part of the coast.

Duncans Landing, 6 miles N of Bodega Head, is a fair small-boat landing in NW weather.

The spit making out from the S point of **Russian River** has been partially reinforced by a short rock jetty, but the mouth of the river is closed by a shallow bar. The bold sharp point immediately to the S of the river appears as an island from the S; it is connected to the mainland by a roadway. Many summer resorts are on the shores of Russian River; at the settlement of **Jenner** there is a landing. Gasoline and water can be obtained nearby.

Ross Mountain, 3 miles inland and N of Russian River, is the highest knob on the ridge. A few clusters of trees are near its summit; the slopes are bare of trees and the gulches are wooded.

From Russian River for 6.5 miles to Fort Ross Cove, the coast is high, consisting of bare steep spurs from Ross Mountain. **Sunken Reef** extends 0.8 mile from shore 4.5 miles NW of Russian River; it is marked by a bell buoy.

Fort Ross Reef, 5.7 miles NW of Russian River and nearly 1 mile SE of Fort Ross Cove, consists of pinnacle rocks 35 feet high, 600 yards offshore, and connected with the beach by a reef which is partially marked by kelp.

Fort Ross Cove, 15.5 miles N of Bodega Head and 33 miles N of Point Reyes, affords good shelter in NW weather. The holding ground is poor, and the anchorage is constricted by a rock that uncovers in the middle of the cove and a rock about 50 yards N of it that is covered 14 feet. The cove is divided into two bights, the W one being slightly the larger. The anchorage is suitable for small vessels only, and if used by strangers should be entered with caution.

Fort Ross was first settled by the Russians in 1812, and the old Russian church is still standing. The buildings have been restored, and the area is now a State Historical Monument. A totem pole at Fort Ross is prominent. There are no landing facilities.

From Fort Ross Cove the coast extends NW and is nearly straight. It is bold and wooded to the crests of the hills which closely approach the coast, and is cut by numerous gulches and bordered by many inshore rocks. The 30-fathom curve is at an average distance of 0.7 mile offshore from Fort Ross Cove for 20 miles to near Gualala River.

Salt Point, 5 miles N of Fort Ross Cove, is 35 feet high, very rocky, and bare of trees; it is bordered by outlying rocks for 200 yards. The 30-fathom curve is less than 0.5 mile off this point.

Fisk Mill Cove, 2.5 miles N of Salt Point, affords fair shelter for small vessels in NW weather. The bottom is rocky, but there are no hidden dangers.

Horseshoe Point, 3 miles N of Salt Point, is a cliff 180 feet high, with a depression of 60 feet immediately behind it. It is a bare of trees; the summit is marked by several projecting rocks.

From Horseshoe Point the coast trends NW for 12.5 miles to Gualala River and consists of cliffs, about 60 feet high, bordered by numerous outlying rocks. The tree line is from 0.1 to 0.5 mile back from the edge of the cliffs.

Fisherman Bay, 26.5 miles NW of Bodega Head, is a fair shelter for small craft in NW weather. There are two covered rocks marked by kelp 350 yards off the S point of the bay. There is a general store at the village of **Stewarts Point** on the N side of the bay.

Gualala Point, 16 miles SE of Point Arena and 1 mile S of Gualala River, is 42 feet high, about 300 yards offshore, and connected with the bluff by a rocky reef covered with sand. Sand dunes extend behind the bluff for 600 yards.

Local magnetic disturbance.–Differences of as much as 8° from normal variation have been reported near Gualala Point, and a difference of as much as 4° near Saunders Reef.

Gualala River intersects the coast 15 miles SE of Point Arena. A long sand beach extends a mile S from the mouth. The white hotel building at **Gualala** can be seen from the W and SW.

Robinson Reef lies N of the mouth of Gualala River and 1.1 miles N of Gualala Point. It consists of a cluster of 25 or more visible rocks about 600 yards offshore, with a covered rock 70 yards WNW of the outer rock.

Bourns Landing is 1.5 miles NW of Gualala River. The anchorage here is exposed and can be used only in the summer. Local knowledge is necessary because the approaches have several covered rocks. Lumber from the Gualala mills was formerly shipped from here.

Havens Anchorage, 12 miles SE of Point Arena and 4 miles NW of Gualala Point, offers shelter for small vessels from the prevailing NW winds S of Fish Rocks. The cove is constricted by rocks and ledges extending 250 yards SE from the W head. Strangers should approach the anchorage with caution. During the summer the anchorage is used extensively by fishing boats in NW weather.

Fish Rocks, two rocky islets 4.2 miles NW of Gualala Point, are connected at low water with the shore and surrounded by numerous smaller rocks. The outer rock is 150 feet high and the inner 100 feet high and 100 yards offshore. A rock 40 feet high lies 175 yards SE of the outer rock.

Havens Neck, 145 feet high and prominent, is 0.6 mile NW of Fish Rocks. It is bare of trees and connected with the bluffs by a narrow neck.

Gualala Mountain, 5 miles inland NE of Havens Neck, is heavily wooded and prominent in clear weather. **Sail Rock,** 44 feet high, is a sharp, pyramidal rock 800 yards offshore, 2.8 miles NW of Fish Rocks. From off Point Arena it resembles a small vessel under sail. **Saunders Reef,** 4.5 miles NW of Fish Rocks, is 0.5 mile offshore. It shows several rocks that uncover and is well marked by kelp. Foul ground extends between it and the shore. A lighted gong buoy is 0.4 mile SW of the outer rock and 7.5 miles SE of Point Arena.

Arena Cove, 2.5 miles SE of Point Arena, is a slight indentation affording shelter to small vessels in NW weather. The S head is a high yellow cliff that under favorable circumstances is visible for a considerable distance. A wharf in poor condition is at the head of the cove with 9½ feet reported at its outer end. A 3-ton hoist is on the wharf; gasoline, diesel fuel, and water are available. Some groceries may be had. A white lookout tower with a red roof on a steel structure is prominent. A lighted bell buoy is 0.6 mile SW from the end of the wharf. To enter, make the lighted bell buoy, then bring the end of the wharf to bear **074°** and stand in on this course. This leads about 150 feet S of a rock covered 16 feet that lies 300 yards 264° from the end of the wharf. In thick weather during the summer in approaching the cove from N or S, the edge of the kelp may be followed which will lead to within 300 yards of the lighted bell buoy. The town of **Point Arena** is on the highway 1 mile E of the landing.

A breaker is reported in a heavy SW swell 0.8 mile WSW of the N point of Arena Cove, and scattered kelp extends almost out to that position.

Point Arena, 68 miles NW of Point Reyes, consists of a long level plateau, diminishing in height to the end of the 60-foot-high point. It is the first prominent point N of Point Reyes. The point is bare of trees for about a mile from the shore.

Point Arena Light (38°57.3'N., 123°44.4'W.), 155 feet above the water, is shown from a 115-foot white cylindrical tower with black gallery at the extremity of the point; a radiobeacon is at the station. A reef that usually shows breakers extends about 0.6 mile NW from the extremity of the point. A lighted horn buoy is off the W side of the reef.

Arena Rock, 1.4 miles N of Point Arena Light, is covered 13 feet and shows a breaker except in very smooth weather. A covered rock which rises abruptly from deep water and breaks only in heavy weather is 200 yards N of Arena Rock.

Caution.–Vessels approaching Point Arena from N in thick weather are advised to keep outside the 40-fathom curve because Arena Rock is only 0.8 mile inside the 30-fathom curve and shoaling near it is abrupt.

Chart 18620.–From Point Arena the coast extends in a general NNW direction for 50 miles and then trends NW for nearly 35 miles to Punta Gorda, thence NNW for 10 miles to Cape Mendocino. The S portion is less bold and rugged than the N portion, and the mountains are neither as high nor as close to the coast. The dangers are all included within the 30-fathom curve, and except for Blunts Reef and the other reefs in the vicinity of Cape Mendocino, do not extend more than a mile offshore. Several submarine valleys with depths greater than 50 fathoms come within 0.5 to 2 miles of the shore between Point Delgada and Cape Mendocino; the currents are irregular in this area.

From Cape Mendocino to Trinidad Head, the coast trends in a NNE direction for 40 miles and, with the exception of the rocks off False Cape, the dangers are within 0.5 mile of the shore. The land is generally low with sandy beaches, broken by the mouths of the Eel and Mad Rivers and the entrance to Humboldt Bay. The only marked elevations N of False Cape are Table Bluff and Buhne Point.

In clear weather the mountains are good landmarks and can frequently be seen when the lower land is obscured by fog or haze.

Between Point Arena and Cuffey Cove, protection from the prevailing NW winds of summer may be had in a few places, but there is none from S or W.

From Point Arena the cliffs of the point extend 0.5 mile NE to the mouth of **Garcia River,** from which sand dunes and beaches extend N for 4 miles. Beyond this point for 40 miles to **Ten Mile River Beach** the coast is rugged, with high, bold cliffs bordered by numerous outlying rocks.

Mal Pass is a steep gulch 5.2 miles N of Point Arena; the bluffs on each side are nearly 280 feet high. **Red Bluff,** 8 miles N of Point Arena, is a prominent reddish 200-foot-high cliff. **Elk Rock,** 8.5 miles N of Point Arena, is 95 feet high and 0.5 mile offshore.

Chart 18626.–**Nose Rock,** 10.3 miles N of Point Arena and 0.7 mile offshore from Elk, is 24 feet high. **Casket Rock,** 700 yards NE of Nose Rock, is the outermost of three large rocks W of a 150-foot cliff fronting the village of **Elk.**

Cuffey Cove, 11 miles N of Point Arena, is a small anchorage affording fair shelter in NW winds. **Cuffey Inlet,** just W of the cove, is an excellent anchorage for small boats in N and W weather. Caution is necessary to avoid the many covered and visible rocks in the approaches to the cove and inlet. A small kelp-covered rock that uncovers lies near the center of the entrance to the inlet. The cove is covered with patches of kelp during most of the year.

From Cuffey Cove for 3 miles to **Navarro River,** the coast consists of cliffs 200 feet high, bordered by outlying rocks. Although the mouth of the river is nearly always closed by a bar with only 1 or 2 feet of water over it, the entrance has fair shelter from NW winds. **Navarro Head,** 405 feet high, is on the N bank of the river.

Chart 18628.–**Salmon Point,** the S entrance point to **Whitesboro Cove,** 1.2 miles N of Navarro River, is a treeless cliff 109 feet high. Detached rocks extend W of the point for 0.2 mile, with **Bull Rock,** a covered ledge, usually showing a breaker 0.5 mile NW of the extremity of the point. In a heavy swell, breakers show between it and the visible rocks off the point. Whitesboro Cove is rocky, exposed to NW and W winds, and seldom used as an anchorage.

Albion Cove, 16.5 miles N of Point Arena, affords good shelter in N weather. The S point at the entrance rises to a knoll 179 feet high; low rocks extend nearly 500 yards W of the point. The N point is a rocky islet 80 feet high lying close to the point which has the same elevation; both are bare. Small visible rocks lie 200 yards W of the islet, and covered rocks, showing breakers in a moderate swell, extend out more than 500 yards WSW from it. The principal danger in the approach is a covered rock, usually showing a breaker, 250 yards S of the islet. **Mooring Rock,** in about the middle of the cove, is 30 feet high, pyramidal in shape, and marked by a light and a seasonal fog signal; small rocks extend from it to the N shore. A lighted whistle buoy marks the entrance to the cove.

The village of **Albion** is on both high banks of **Albion River.** Several small piers on the river serve the commercial and sport fishermen. Gasoline, diesel oil, water, ice, fishing supplies, and a launching ramp are available. The river is crossed by a fixed highway bridge that has a clearance of 118 feet, 0.1 mile above the mouth.

COLREGS Demarcation Lines.–The lines established for the Albion River are described in 80.1260, chapter 2.

Between Albion Cove and Colby Reef, breakers are seen in a heavy swell nearly 0.5 mile from shore; vessels should not approach closer than 1 mile.

Stillwell Point, 1.6 miles N of Albion Cove, is a bold, sharp 190-foot cliff. A 141-foot-high rocky islet lies close inshore on its NW side. A yellow slide is on the S face of Stillwell Point. **Colby Reef,** 0.5 mile offshore W of Stillwell Point, consists of a rocky patch covered 1½ fathoms. Numerous other dangers are just inside the 20-fathom curve along this stretch of coast.

Little River, 19 miles N of Point Arena, offers shelter in the entrance cove. The reefs and rocks surrounding the cove are well marked by kelp, and a heavy undertow is felt when in the vicinity of the rocks. The NW shore of the cove is bluff, rocky, and bare of trees for over 0.5 mile. The entrance is marked by a bell buoy, but the channel narrows to 60 yards by covered rocks N of the inner visible rock. The beach area at Little River is a State Park.

The 2-mile coast between Little River and Mendocino Bay is a broad tableland with a seaward face of cliffs, 40 to 60 feet high, bordered by numerous low rocks. The tree line is over 0.5 mile from the cliffs.

Mendocino Bay, 21 miles N of Point Arena, affords fair shelter in NW weather, but vessels are obliged to leave in S or W weather. In heavy SW gales the sea breaks clear across the entrance. The S point at the entrance is a rocky, irregular cliff 100 feet high, bordered by numerous rocks extending 150 yards offshore. A knoll 156 feet high is 300 yards inshore from the point. A reef covered 3½ fathoms extends 500 yards NW of the outermost visible rock. This area should be avoided when there is any swell running. The N point is a broken cliff 60 feet high, bordered by numerous rocks close inshore. A whistle buoy marks the entrance to the bay.

Big River enters in the NE part of Mendocino Bay. The town of **Mendocino** is on the N shore of the bay. Water is available.

Russian Gulch, 2 miles N of Mendocino, is a small cove occasionally used as an anchorage by small craft with local knowledge as it affords excellent protection. A State Park is at the head of the cove. The concrete arch highway bridge across Russian Gulch should show well from S to W. An important danger is a rock awash 400 yards NW of the S entrance point. A reef covered 1½ fathoms extends 200 yards SE of the rock.

Point Cabrillo, 3 miles N of the town of Mendocino and 24 miles N of Point Arena, is a flat-topped point 50 to 60 feet high terminating seaward in nearly vertical cliffs; numerous low rocks extend offshore over 200 yards, and the 30-fathom curve is barely 0.2 mile outside of them. A lighted horn buoy is 0.9 mile W of the point (chart 18626). The point is bare except for a few trees at the houses near the light.

Point Cabrillo Light (39°20.9'N., 123°49.5'W.), 84 feet above the water, is shown from a 47-foot white octagonal frame tower on a dwelling on the point.

From Point Cabrillo the coast trends N for 9 miles to Laguna Point as a nearly straight line of bluffs, with numerous rocks close under the cliffs. It is moderately high, partly wooded to the face of the cliffs, and is broken by several indentations and small streams. The 30-fathom curve is an average distance of 1 mile from shore.

Caspar Anchorage, a mile N of Point Cabrillo, is a small cove at the mouth of **Caspar Creek.** Fair shelter, except from W, is afforded, but the anchorage is constricted and seldom used. The village of **Caspar** is on the N bank of the creek near its mouth.

Chart 18626.–From Caspar Creek for 4 miles to Noyo Anchorage the coast consists of broken irregular cliffs, 40 to 60 feet high, with numerous rocks extending 400 yards offshore. These are fairly well fringed by kelp, especially in summer.

Noyo Anchorage, 5 miles N of Point Cabrillo, affords fair shelter from N or S. The anchorage is limited to an area about 400 yards long and less than 200 yards wide, with depths of 3½ to 6½ fathoms. Buoys mark the entrance to the anchorage.

Noyo River enters at the head of Noyo Anchorage. A jetty with a light on its outer end and fog signal 80 yards inshore is on the N side of the entrance, and a small jetty with a daybeacon on the outer end is on the S side of the entrance. A radiobeacon is about 325 yards NNE of the N jetty light. A fixed highway bridge across the river, 300 yards E of the mouth, has a clearance of 80 feet. The river above the first sharp bend affords excellent protection for small boats. A dredged channel leads between the jetties to **Noyo Basin,** about 0.6 mile above the entrance. In July 1981, the midchannel controlling depth was 9 feet to Noyo Basin. Depths of about 10 feet are reported in Noyo Basin. The basin is protected by a breakwater which is marked on its outer end by a light. The river channel is marked by a daybeacon, lights, and a **104°45'** lighted range. Depths of 1½ feet have been reported available in the river to **Dolphin Cove,** about 0.5 mile above Noyo Basin.

Overhead power cables crossing the river have a least clearance of 80 feet.

Caution is necessary in entering to avoid the reefs and a rock on the S side of the entrance. Heavy W or SW swells form breakers at the entrance to the river; once inside there is good shelter. With W winds and seas, heavy surge is felt in the river as far as Noyo Basin.

COLREGS Demarcation Lines.–The lines established for the Noyo River are described in 80.1265, chapter 2.

The lower section of Noyo River is the principal commercial and sport fishing center of this section of the coast. Many fishing boats are based here. Most of the facilities extend along both banks of the river to about 0.5 mile above the entrance. Water and ice can be obtained at several fishhouses with wharves having depths from 4 to 8 feet alongside. Berths, gasoline, diesel fuel, water, ice, marine supplies, and launching ramps are available at the facilities along the river and at Fort Bragg. Machine shops and marine railways can handle vessels up to 45 feet for hull and engine repairs. A Coast Guard cutter is stationed on the S bank of the river just above the fisheries dock.

From Noyo River for 0.7 mile to Fort Bragg, the coast consists of rocky cliffs, 40 to 60 feet high, bordered by rocks and sunken ledges extending 100 to 400 yards offshore.

Fort Bragg, 30 miles N of Point Arena, is the largest coast town between San Francisco and Eureka. It is near the head of a cove formerly known as **Soldiers Harbor.** The former loading wharf has been removed; lumber is now shipped out by rail and truck. Groceries can be obtained, and minor repairs made.

The cove is constricted by the rocks and ledges extending from both the N and S, leaving only a limited area for small boats to anchor. A rocky reef, partly bare at high water, extends SW from the N head and breaks the force of the swell from NW. In W weather the cove is wide open. Since Noyo River gives better protection, the cove is seldom used.

For 3 miles from Fort Bragg to Laguna Point, the coast is moderately low and rocky and cut by two small streams; the tree line is within 0.2 mile of the beach.

Laguna Point, 8.5 miles N of Point Cabrillo, is near the S end of Ten Mile River Beach. It is a small, projecting cliff, 30 feet high, flat-topped, and bare of trees for 600 yards. It is noticeable only when close inshore. A bare reef extends 300 yards NW from the point. The cove immediately N of Laguna Point is exposed and only available for small boats. It affords fair protection in S weather and is occasionally used in winter.

Bald Hill(chart 18620), 2.5 miles SE of Laguna Point, is a prominent landmark; its summit and SW slope are bare of timber.

Chart 18620.–For 0.5 mile N of Laguna Point the bluffs are low, thence a straight sand beach extends for 3 miles to the mouth of **Ten Mile River.** The beach is backed by sand dunes for 0.5 mile inland; the tree line is about 1.5 miles from the beach. The concrete highway bridge over Ten Mile River is conspicuous from the W.

From Ten Mile River the coast extends in a general NW direction for 52 miles to Punta Gorda. This stretch of the coast is particularly bold and rugged, bordered by numerous rocks, and is heavily timbered as far as Point Delgada. N of Point Delgada the tops of the ridges are generally bare or only partly covered with trees and brush. The cliffs along the shore range from 40 to 100 feet in height. The high, rugged mountains in the vicinity of the coast, which reach elevations of 3,000 to 4,000 feet, are prominent.

Kibesillah Rock, 1.2 miles N of Ten Mile River and 0.4 mile off the line of the cliffs, is the outermost danger for many miles N and S. It is small and washed over almost continuously even in ordinary weather. Other rocks and rocky islets up to 80 feet high are inside of Kibesillah Rock.

Bells Mountain, 4.5 miles N of Ten Mile River and 0.5 mile inland, is bare on top with a few trees on the oceanside.

Switzer Rock, 5.5 miles N of Ten Mile River and 0.3 mile offshore, is small with deep water close around it; every large swell washes over the rock. A covered rock marked by a breaker is 170 yards SE of Switzer Rock.

Gordon Hill, 6.5 miles N of Ten Mile River, is bare to the summit and terminates seaward in 60-foot-high **Abalone Point,** which is bordered by low outlying rocks.

Hardy Rock, 9.5 miles N of Ten Mile River and 0.4 mile offshore, is a small 47-foot-high islet.

From Abalone Point the coast trends NW for 4 miles to **Cape Vizcaino,** which is a broad, irregular line of precipitous cliffs, 100 feet high, very broken, and bordered by low rocks, 200 to 300 yards offshore.

Island Knob, a rocky lime-covered islet, lies close-to and almost connected with Cape Vizcaino. A covered rock marked by a breaker is 275 yards W of the islet. **Cottaneva Rock,** 20 feet high, is 500 yards SE of Island Knob and 275 yards offshore. Several smaller rocks lie inside of it and two others about 160 yards NW.

Cahto Peak, 11.5 miles E of Cape Vizcaino, is prominent in clear weather.

Between Cape Vizcaino and Point Delgada are several small exposed landings available for use only in the summer and in smooth weather. The landings formerly were used to ship ties, tanbark, and shingles which were loaded on vessels by means of wire cables.

Sea Lion Rock, a mile N of Cape Vizcaino and 500 yards offshore, is 5 feet high and inhabited by sea lions. **Cottaneva Needle,** 0.5 mile N of Sea Lion Rock, is a prominent black pinnacle rock 55 feet high.

Double Cone Rock is 3.5 miles N of Cape Vizcaino and 300 yards offshore.

Usal Rock, 5 miles N of Cape Vizcaino, is 45 feet high and black in color. It lies 200 yards off a small point of rocks.

The mouth of **Usal Valley** is about a mile N of Usal Rock, and is a narrow, steep gulch, in front of which is a small area of flat land with a low beach. A small grassy hillock is just inside the gulch. The view up the valley is open for a very short time while passing.

Big White Rock, 95 feet high, lies 7.7 miles N of Cape Vizcaino, and 125 yards offshore from the steep cliffs, which are bordered by numerous rocks. The rock is a prominent feature when the higher points of the land are in fog.

Anderson Cliff, 10 miles N of Cape Vizcaino, is a projecting rocky spur 715 feet high, with one large rock and numerous smaller ones close inshore. **Jackson Pinnacle,** 1.1 miles N of Anderson Cliff, is a black rock 45 feet high, so close to the rocky beach that from seaward it is hard to distinguish from the bluff behind it. When seen from alongshore, it is prominent.

Cluster Cone Rock, a prominent 68-foot pinnacle, is the largest and whitest of a small cluster of 6 rocks, 200 yards offshore, lying 12.5 miles N of Cape Vizcaino.

Morgan Rock, a large white-topped, block-shaped rock 57 feet high and 0.5 mile NW of Cluster Cone Rock, shows prominently. It is the largest of a group of rocks extending some 200 yards from a high rocky cliff and is particularly valuable as a landmark when higher land is covered by fog.

Bear Harbor Ridge, a detached coastal ridge about a mile NW of Cluster Cone Rock, has two peaks; the S one, 375 feet high, is the higher. It is the most prominent feature in this vicinity when viewed from the NW. The seaward face of the ridge is marked by steep, loose slides.

Needle Rock, 46 feet high, is 14.5 miles N of Cape Vizcaino; the rock blends into the bluff from offshore. A group of old mill buildings, a few houses, and an old landing platform about midway up the flat mark the abandoned landing.

Small White Rock, 37 feet high, lies 5 miles N of Cluster Cone Rock and 4 miles S of Point Delgada. It is close inshore and just outside the low-water beach; once identified, this rock makes a valuable landmark.

From just below Small White Rock to Point Delgada, the country is not timbered, but is covered with dense, low brush, which presents a uniform dark green appearance.

A submarine ridge known as a **Tolo Bank** extends S from Point Delgada for about 7 miles. The depths are quite irregular; the least depth found is 9 fathoms.

Caution.–The area just S of Shelter Cove is subject to slides which might deposit rocks along the shore.

Point Delgada, 66 miles N of Point Arena, and nearly 20 miles S of Punta Gorda, is a cliff-faced plateau making out about a mile from the general trend of the coast. The seaward face of the plateau is a mile long and bordered by numerous rocks. A lighted whistle buoy is 1.1 miles SW from the point, and a bell buoy is 0.8 miles SE from the point. A paved airplane landing strip is on the point.

Shelter Cove lies under the S face of Point Delgada and affords fair shelter in NW weather, but is exposed and dangerous with S or W winds. Occasionally a swell runs in the cove. There are no wharves in the cove. Water may be obtained ashore, but must be carried down from the plateau. A marine supply store is on the bluff on the W side of the cove. Gasoline, lubricants, and marine supplies are available. A 1½-ton mobile lift is used on the beach for lifting small craft in and out of the water. The owner of the marine supply store monitors VHF-FM channel 11 (156.55MHz) during the store's operating hours.

Shelter Cove is used extensively as an anchorage by fishing boats. A paved road is maintained to the cove. Telephone service is available.

The rocks covered 1 to 5 fathoms S of Point Delgada can be avoided in approaching Shelter Cove by staying over 200 yards S of the lighted whistle buoy and E of the bell buoy.

From Point Delgada the coast extends NW for 19 miles to Punta Gorda, and is backed by steep mountains covered with chaparral and trees. A sand beach, 0.8 miles N of Point Delgada, extends N for 4 miles. **Kaluna Cliff** overlooks the S end of the sand beach, and its steep face, scarred by frequent slides, is a noticeable landmark.

King Peak, 4,090 feet high, the highest of three, is the well-known landfall generally called **Three Peaks.** It lies 8.5 miles N of Point Delgada, 2.5 miles from the coast, and in clear weather is visible seaward for about 75 miles.

About 6 miles N from Point Delgada is the head of **Delgada Canyon,** a submarine valley; the 100-fathom curve lies within 0.5 mile of the beach. This valley extends in a N direction with an average width of 1 mile between the 100-fathom curves for 3.5 miles, and then expands, funnel-shaped, for 3 miles more. Over 400 fathoms are found at its mouth and 300 fathoms within 4 miles of the beach. The side slopes are steep.

Big Flat is a narrow strip of low, flat land 7 miles NW of Point Delgada. It is 2 miles long and is bordered by sand beaches. A few abandoned ranch houses and barns are at the S end of the flat. **Shubrick Rock,** low and small, lies 300 yards off the S end.

About 11.5 miles NW of Point Delgada is the head of **Spanish Canyon,** a submarine valley. The 100-fathom curve lies within 2 miles of the shore.

In 1974, a rock awash was reported about 2.5 miles offshore, 14 miles NW of Point Delgada, in 40°10′25″N., 124°18′30″W.

Reynolds Rock, 10 feet high, is 14.5 miles NW of Point Delgada. It is 550 yards offshore and, when seen from close inshore, appears as a double-headed rock over which the swell breaks in nearly all weather.

Rodgers Break, 0.5 mile W of Reynolds Rock, is covered ½ fathom. This pinnacle rock lies 4 miles

SE of Gorda Rock and 6.8 miles WNW of Big Flat; it seldom breaks and the top is occasionally seen in a heavy swell. A pinnacle rock covered 3 fathoms lies about 0.5 mile NW of Rodgers Break and about the same distance offshore. It probably breaks in very heavy weather. This pinnacle, Rodgers Break, and the reported rock awash 14 miles NW of Point Delgada are the outermost known dangers in this stretch of the coast.

From Reynolds Rock NW to Punta Gorda the shore is bordered by numerous rocks extending about 0.3 mile offshore. The sharp depression in the hills near the coast, caused by the gulch of **Cooskie Creek,** 3.5 miles S of Punta Gorda, is sometimes useful on dark nights to vessels close inshore in making the point from S.

Chart 18623.–Punta Gorda is a high, bold, rounding cape, 83 miles NW of Point Arena and 11 miles S of Cape Mendocino. The seaward face rises to about 900 feet, 400 yards back from the beach, and terminates in a spur, 140 feet high, almost overhanging the sea. It is bare of trees except in the gulches. The gray rectangular structure of an abandoned lighthouse, 25 feet high, is S of the point. For over 1.5 miles N and about 2 miles S of the point, the beach is bordered by numerous rocks and shoals extending in some cases 0.6 mile offshore.

The wind, sea, and currents off Punta Gorda are probably as strong as off any point on the coast; frequent and strong tide rips have been noted. Many times when the weather at Shelter Cove and even at Big Flat is clear and calm and the sea smooth, both the wind and the sea will pick up as Punta Gorda is approached, until just N of this point where strong breezes to moderate gales will be experienced. At other times clear weather S of this point will lead to fog N, or vice versa.

Gorda Rock, 10 feet high and conical in shape, is 0.7 mile S of Punta Gorda and 0.6 mile offshore. A lighted whistle buoy is 300 yards SW from the rock.

Conical Rock, 20 feet high, is 100 yards off the point, and another 20-foot rock is 350 yards N from it; these rocks have foul ground between them.

From Punta Gorda to Cape Mendocino the hills back of the coast are lower than those S; they are bare of trees and bordered by stretches of low, narrow, sandy flats with a narrow, low-water beach. The outlying rocks are not more than 0.7 mile offshore until about 2.5 miles S of Cape Mendocino, where they extend offshore to Blunts Reef, 2.5 miles W of the cape. **Mattole Canyon,** a narrow submarine valley, is 3 miles N of Punta Gorda where the 100-fathom curve is about 1 mile from the beach. **Mendocino Canyon** is 4.5 miles S of Cape Mendocino where the 100-fathom curve is about 2 miles from the beach.

Christmas Rock, covered 1¼ fathoms, is 0.9 miles NW of Punta Gorda.

Mattole River, 2 miles N of Punta Gorda, is not navigable. The N 360-foot-high head is bare and the S head, about the same height, is partly covered with oak trees. A prominent sand dune is on the S side at the entrance to the valley. Another large sand dune, 3.5 miles to the N, marks the N side of **McNutt Gulch** and should not be confused with the one at Mattole River.

Mattole Point is 0.3 mile N of the river at the base of **Moore Hill. Sea Lion Rock,** 8 feet high, is 0.3 mile N of Mattole Point and 250 yards off the beach at the head of Mattole Canyon. A rock covered ½ fathom lies 0.4 mile NW of Mattole Point.

A rock, 16 feet high, is the largest of a cluster of small rocks 0.5 mile offshore and nearly 4 miles N of Punta Gorda. **The Brothers,** 8 feet high, consist of two small rocks, close together, 800 yards offshore and 1.5 mile NNW of Sea Lion Rock. **Mussel Rocks,** 0.9 mile N of The Brothers, form a ledge that projects 400 yards from the shore.

Devils Gate Rock, 20 feet high, lies nearly 2.8 miles S of Cape Mendocino and 0.5 mile offshore. It is low and pyramidal, with a smaller rock close under the NW face. A reef extends 200 yards W from the rock; numerous rocks lie inshore. A rocky shoal covered 3¾ fathoms lies 1.4 miles W of Devils Gate Rock.

A rock which bares 1 foot is about 1.1 miles NNW of Devils Gate Rock and 0.8 mile offshore.

Steamboat Rock, 30 feet high, lies 1.5 miles S of Cape Mendocino and 600 yards offshore. The upper part of the rock is white and the lower black, somewhat resembling a steamer with a low black hull and white upper works.

Cape Mendocino, 185 miles N of San Francisco Bay entrance and 367 miles S of Columbia River entrance, is a mountainous headland, the famous landmark of the old Spanish navigators and the galleons from the West Indies. The cape is the turning point for nearly all vessels bound N or S. In view of the dangers in the vicinity, it should be approached with considerable caution in thick weather; the bottom and the currents are very irregular. It is in the latitude of great climatic change; the winds do not blow home so violently in the bight S of it, and the amount of rainfall increases rapidly to the N. Fog is more prevalent S. The strong NW winds of summer are less violent S of the cape, which forms a parallel lee for vessels working their way N.

The seaward face of Cape Mendocino is steep, rocky, and water worn toward the shoreline. NE of the light the general appearance is rolling and grass-covered, except in the deep ravines and upon some of the steep hillsides where the N exposure is covered with forest or brush. For about 3 miles S of the cape, the beach is bordered by numerous rocks and sunken ledges extending in some cases to over 0.5 mile offshore.

Cape Mendocino Light (40°26.4′N., 124°24.3′W.), 515 feet above the water, is shown from a pole on the W slope of the cape. An abandoned lighthouse is 70 yards 298° from the light.

Sugar Loaf, 326 feet high, is 250 yards W of Cape Mendocino and is connected with it at low water by a narrow neck of rocks and shingle beach. This rock is a prominent feature in making the cape from either N or S, but in thick or hazy weather care should be taken to avoid mistaking it for False Cape Rock, which it somewhat resembles, that is in a similar position off False Cape, 4.5 miles N of Cape Mendocino. False Cape Rock is about 216 feet high and is not so regular in outline as the Sugar Loaf, and, from the W or NW, shows two large rocks, 95 and 54 feet high, immediately inside it, whereas the Sugar Loaf stands solitary and compact. As seen from the SW, Sugar Loaf shows a cave on its SW face, extending about one-third the height of the rock.

Blunts Reef, 2.9 miles W of Cape Mendocino Light, is one of the outermost visible dangers off Cape Mendocino. The reef consists of two small black rocks awash about 230 yards apart. **Blunts Reef Lighted Horn Buoy B** (40°26.4'N., 124°30.3'W.), replacing Blunts Reef Lightship, is a large navigational buoy (LNB) 1.7 miles WSW of the outer rock. The buoy is painted red, shows a light 42 feet above the water, and is equipped with a radiobeacon and a fog signal. The currents at the buoy are described in the Tidal Current Tables.

The area as far W as Blunts Reef Lighted Horn Buoy B and for about 4 miles N and S of Cape Mendocino includes dangerous rocks and covered ledges. Vessels should not attempt the passage between Blunts Reef Lighted Horn Buoy B and the cape under any circumstances. A heavy W swell breaks even in 9 to 10 fathoms in this locality.

From Cape Mendocino for 4.5 miles to False Cape, the coast is straight, bold, and bordered by a broad low-water beach.

False Cape is a steep, bold headland, rising to a height of over 600 feet in less than 0.2 mile from the beach; it projects slightly from the general trend of the coast. It is covered with grass, but the gulches on its sides are wooded. The base of the cape is bordered by a narrow, low-water beach of shingle and sand. For about a mile on each side of the cape are numerous rocks and ledges, the outermost of which are about a mile from the beach.

False Cape Rock, 216 feet high, lies 0.4 mile W of the cape; other rocky islets are between it and the shore. It is not as regularly shaped nor as high as the Sugar Loaf off Cape Mendocino, and the top is much flatter. A rock covered 1¾ fathoms lies 0.6 miles W of False Cape Rock. **Mussel Rock,** 7 feet high, is 0.8 mile N of False Cape Rock.

Chart 18620.–N of False Cape the hills decrease in height; 4 miles beyond the cape is the beginning of a stretch of sand beach and dunes, broken only by Table Bluff and Buhne Point, that extend to Trinidad Head.

Centerville Beach, 4 miles N of False Cape, is not prominent from seaward. A white cross is on the 120-foot bluff just S of Centerville Beach. A number of buildings, comprising the U.S. Naval Facility for oceanographic research, are on the bluffs 0.8 mile S of the village.

Eel River empties 8 miles N of False Cape. This is a stream of considerable size and is occasionally entered by light-draft vessels, but the channel over the bar is continually shifting. The depth on the bar varies largely with the amount of water in the river, depending upon the character of the winter, and has been at times as much as 14 feet, but generally the depth is about 8 or 9 feet. The river is seldom entered except by fishing boats and other very small craft, and then only by those with local knowledge of the bar.

Eel Canyon is a submarine valley extending in a NW direction. It comes to a head 10 miles NW of Cape Mendocino. Vessels are cautioned against mistaking this valley for one of those S of the cape.

Chart 18622.–Table Bluff, 12 miles N of False Cape and 4.5 miles S of Humboldt Bay entrance, is a prominent feature from seaward. The W face is 0.5 mile long, 165 feet high, and very steep, and has a narrow sand beach under it.

From Table Bluff for 4 miles to Humboldt Bay entrance the coast consists of a narrow sand spit.

Humboldt Bay, 21 miles N of Cape Mendocino Light, is the first important harbor N of San Francisco and is used by vessels drawing up to 31 feet. It can be used as a harbor of refuge in impending bad weather, providing a vessel can get inside before the bar becomes impassable. The bay consists of two shallow basins, South Bay in the S and Arcata Bay in the N part, connected by a narrow channel about 5 miles long.

The redwood timber industry dominates Humboldt Bay. Large quantities of lumber and wood products are shipped to both foreign and domestic ports. General merchandise, gasoline, and fuel oil are received.

Routes.–A pilot should be engaged by deep-draft vessels and by strangers if there is any sea on the bar. Because the bar is subject to change, the entrance ranges may not always mark the deepest channel.

From S.–From a position 1.5 miles 260° from Blunts Reef Lighted Horn Buoy B, steer **356½°** for 5 miles, when Cape Mendocino Light bears 126°; thence a **038½°** course made good for 20 miles leads to Humboldt Bay Entrance Lighted Whistle Buoy HB. In thick weather, after passing False Cape Rock, all dangers will be cleared by keeping in a depth of over 15 fathoms until up with the lighted whistle buoy, where anchorage should be made until a pilot is obtained.

From N.–From a position 3 miles W of Trinidad Head Light, a **187°** course, made good for 17 miles, leads to Humboldt Bay Entrance Lighted Whistle Buoy HB. In thick weather the depths should not be shoaled to less than 20 fathoms between Turtle Rocks and Trinidad Head and, when S of the head, the depths should not be shoaled to less than 15 fathoms until up with the lighted whistle buoy, where a vessel should anchor until a pilot is obtained.

From seaward.–In clear weather the high land of Cape Mendocino and Punta Gorda S, and Trinidad Head N of the entrance, are good landmarks. At night, the lights are a good guide. In thick weather soundings should be taken frequently, and upon getting depths of 30 fathoms or less great caution must be exercised until sure of the vessel's position, when the course should be shaped for the lighted whistle buoy.

Sailing craft during the prevailing NW winds of summer should try to make the land in the vicinity of Trinidad Head; this gives a fair slant for the entrance and is an additional precaution against the irregular S set of the current. In thick weather soundings should be taken constantly when inside of 50 fathoms. Making the land N of the entrance avoids the irregular bottom and dangerous currents in the vicinity of Cape Mendocino.

From the Humboldt Bay Entrance Lighted Whistle Buoy HB, make good a course of **105°** following the Humboldt Bay Approach Range to the intersection with Humboldt Bay Entrance Range, thence a course of **140°** on the entrance range into the bay. The entrance range parallels the S jetty and is only about 150 yards from it. The turn from the approach to the entrance range, 200 yards off the outer end of the S jetty, is rather abrupt and is difficult under certain conditions of wind, sea, and current. Inside the bay the channels are well marked by navigational aids.

The approach to the bay is marked by a lighted whistle buoy and a bell buoy off the entrance, and approach range lights and a fog signal on the outer end of the North Spit. A light is on the S jetty, about 100 yards from the outer end, and a light is shown near the end of the N jetty. Range lights and lighted buoys mark the entrance channel inside the bar. A radiobeacon is on North Spit about 0.4 mile NE of the approach range rear light.

Note.–The outer range should not normally be used beyond its intersection with the inner range. The inner range should not normally be used seaward of the outer end of the jetties. In 1973, it was reported that the inner range was difficult to distinguish in restricted visibility.

Two jetties are at the entrance to the bay, 750 yards apart. The bar NW of the S jetty is subject to considerable shifting and shoaling at times, especially during the winter.

In the past **Humboldt Bar** was considered treacherous and dangerous, and many disasters have occurred there. With the present improvements, however, and by employing local pilots, vessels may enter or leave with comparative safety. The strong currents that may be encountered, and the abrupt turn at the outer end of the S jetty, are apt to be dangerous for strangers. The bar is the smoothest during the last of the flood current, and it is often passable at this time and impassable 2 hours later, when the ebb current has set in. Caution should also be exercised inside the jetties due to the rapid change in the channel conditions. Deep-draft vessels are usually taken in and out of the bay at high tide if there is any swell on the bar because of the shoaling in the entrance channel.

COLREGS Demarcation Lines.–The lines established for Arcata–Humboldt Bay are described in 80.1270, chapter 2.

Channels.–Federal project depths for Humboldt Bay are 40 feet over the bar, thence 40 feet through the entrance, thence 35 feet in North Bay Channel, thence 30 feet in Eureka Channel outer reach and 26 feet in the inner reach. Project depth in Samoa Channel is 35 feet, and in Fields Landing Channel leading to South Bay is 26 feet. Maintenance dredging is performed regularly. (See Notice to Mariners and latest editions of charts for controlling depths.)

Prominent features.–Humboldt Bay Light (40°45.9'N., 124°13.7'W.), 100 feet above the water and shown from a white column on North Spit, is the best landmark by night; the approach range rear light also is shown from the Humboldt Bay Light structure. By day the tall stacks and the smoke from the sawmills in the bay can usually be seen. North Spit has clumps of trees along the bay shore near the channel while South Spit is barren. The red bluff at **Buhne Point** on the E shore of the bay, a nuclear powerplant with three stacks (the tallest of which is charted) about 0.5 mile E, and a lighted radio tower about 0.5 mile farther E, are conspicuous in entering the bay. A Coast Guard station is inside the North Spit, 0.5 mile from the S end.

South Bay, in the S part of Humboldt Bay, is about 3 miles long and 2 miles wide. A marked channel on the E side of the bay leads to a lumber wharf on the E side of the channel at **Fields Landing.**

Bucksport is on the E shore about 3 miles above the entrance. The two oil piers at Bucksport are used by tankers and barges.

Fairhaven is a small town on the W shore, about 3.5 miles above the entrance. The pier of a pulp company is here. A concrete stack and a silver elevated tank of a plywood plant are prominent SW of the pier.

Eureka, the principal town on the bay, is on the E shore, 4 miles N of the entrance. It handles much of the waterborne commerce on the bay. Eureka is the terminus of the Northwestern Pacific Railroad Co.; a branch of the railroad continues to Arcata and Samoa.

Samoa is a small settlement on the W shore opposite Eureka, about 5.5 miles above the entrance. A large lumbermill here ships a considerable amount of lumber. Three black tanks W of the mill and one S of the mill are prominent.

Arcata Bay, the N part of Humboldt Bay, is about 3 miles in diameter with low, marshy shore cut by sloughs. **Arcata** is on the N shore of the bay. The town has no serviceable wharves. The ruins of several old wharves are near the head of abandoned Arcata Channel.

Anchorages.–The best anchorage is between **Bucksport** and the light at the S end of **Indian Island,** according to draft. Vessels in anchoring must keep clear of the cables crossing the channel just above Fairhaven. It is forbidden to anchor in Eureka Channel longer than 24 hours at a time. If obliged to anchor outside the bar, the best anchorage will be found S and W of the lighted whistle buoy in about 90 feet, sand and clay bottom.

Bridges.–A fixed highway bridge crosses Humboldt Bay from Eureka to a point just above Samoa on the Samoa Peninsula. Clearances of the fixed spans are 40 feet from Eureka to Woodley Island; 30 feet from Woodley Island to Indian Island; and 45 feet from Indian Island to the Samoa Peninsula.

(See 117.1b, 117.710, and 117.718, chapter 2, for drawbridge regulations and opening signals for Eureka Slough, E of Eureka.)

Tides.–The mean range of tide at Eureka is 4.8 feet, and the diurnal range of tide is 6.7 feet. A range of about 11 feet may occur at the time of maximum tides. Daily predictions for Humboldt Bay (South Jetty) are given in the Tide Tables.

Currents.–The tidal currents follow the general direction of the channels. In the main channel, the average velocity is less than 2 knots and the maximum does not exceed 3 knots. Between the jetties, the average velocity is about 2 knots, with a maximum of about 4 knots. Current predictions are given in the Tidal Current Tables.

Weather.–The climate of Eureka is completely maritime, and high humidity prevails the entire year, which is divided into the "rainy" season and the "dry" season. The rainy season begins in October and continues through April. About 90 percent of the year's precipitation falls during this period. The dry season extends from May through September and is marked by considerable fog or low cloudiness. Usually, however, the fog clears in the late forenoon and the early afternoons are generally sunny.

Temperatures are moderate the entire year. Although the highest ever recorded was 85°F, and the lowest 20°F, the usual range is from a low of about 35°F to a high of about 75°F. The daily range of temperature averages from about 9°F in the summer to 13°F in the winter, and is occasionally not over 2° to 3°F.

The principal industries are lumbering, fishing, and dairy farming. Owing to the low temperatures and lack of sunshine, there is very little truck farming, but the climate is nearly ideal for berries and flowers.

The National Weather Service office is in the Federal Building in Eureka. **Barometers** may be compared there or by telephone.

See page T-5 for **Eureka climatological table.**

Storm warning signals are displayed. (See chart.)

Pilotage.–Pilotage is compulsory for foreign vessels and U.S. vessels under register. The Humboldt Bay/Bar Pilots Association serves Humboldt Bay and its tributaries. The pilot office is at Eureka, Calif. The pilot office and the pilots, at their homes, monitor VHF-FM channel 16 (156.80 MHz). The pilot boats monitor VHF-FM channels 13 (156.65 MHz) and 16, and the pilot office and boats use 13, 18A (156.90 MHz) and 77 (156.87 MHz) as working frequencies. The pilot boats, TUG THOR and TUG PETREL, each has a black hull and a red lower superstructure with a white upper house. Arrangements for pilots are usually made by ships' agents by telephone (707-443-5688 or 707-443-3559). The operational status of the engines, draft, and estimated time of arrival are required within 4 hours of arrival.

Pilots board vessels about 0.5 mile W of Humboldt Bay Entrance Lighted Whistle Buoy HB (40°46.4'N., 124°16.2'W.). When boarding, pilots request vessels maintain a speed not to exceed 5 knots and rig the pilot ladder on the leeward side about 9 feet above the water.

In the summer, vessels are entered on flood and ebb tidal currents; in the winter, vessels usually are entered on the first or last of the flood or first of the ebb. Vessels depart on flood tidal currents only, regardless of the time of year. Vessels with drafts over 30 feet to 35 feet, enter or depart on the last of the flood from November through March 30; night sailing depends on the bar condition before dark.

Towage.–Tugs up to 660 hp are available.

Eureka is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) The city has several hospitals.

Coast Guard.–The Humboldt Bay Coast Guard Station is on North Spit. The **Captain of the Port** maintains an office in Samoa. A **vessel documentation office** is in Eureka. (See appendix for addresses.)

Harbor regulations.–These regulations are prescribed by the State and the Harbor Commission. A wharfinger, located at the Eureka Boat Basin, foot of Commercial Street, has jurisdiction over fishing and pleasure craft using the facilities at the city-owned boat basin.

Wharves.–The deep-draft facilities at Humboldt Bay are alongside the channels leading to Arcata Bay and at Fields Landing in South Bay. Only the deep-draft facilities are described. The alongside depths for the facilities are reported; for the latest depths, contact the private operators. All facilities have direct highway connections, and most facilities have railroad connections. Water and electric shore power connections are available at most of the piers and wharves. Most of the piers and wharves are used in the shipment of forest and petroleum products and the receipt and shipment of fish. Some farm and dairy products are also shipped.

Standard Oil Company of California Pier (40°46'41"N., 124°11'20"W.): N side, 269 feet long; 28 feet alongside; deck height, 10½ feet; receipt of petroleum products, fueling tugs; owned and operated by Standard Oil Co. of California.

Eureka Forest Products Wharf (40°47'41"N., 124°11'50"W.): 400 feet long; 31 feet alongside; deck height, 5 feet; shipment of forest and fish products; owned and operated by Eureka Forest Products, Inc.

Union Oil Wharf: 0.1 mile N of Eureka Forest Products Wharf; 300 feet long; 25 feet alongside; receipt of petroleum products; owned and operated by Union Oil Co.

Dock A: 0.1 mile N of Union Oil Co. Wharf; 375-foot-long wharf; 30 feet alongside; deck height, 11 feet; 4 acres of open storage; shipment of lumber, plywood, and fish; owned by Louisiana-Pacific Corp., operated by Humboldt Dock and Shipping Co.

Dock B: 0.3 mile N of Dock A; 500-foot-long wharf; 23 feet alongside; deck height, 11 feet; shipment of lumber and plywood; owned by Louisiana-Pacific Corp., operated by Humboldt Dock and Shipping Co.

Louisiana-Pacific Cargo Wharf (40°49'00"N., 124°10'50"W.): 1,064 feet long; 31 feet alongside; deck height, 9½ feet; open and covered storage; shipment of logs, lumber, and pulp; owned and operated by Louisiana-Pacific Corp.

Louisiana-Pacific Chip Wharf: 0.8 mile S of Louisiana-Pacific Cargo Wharf; 1,200 feet of berthing space; 32 feet alongside; deck height, 17 feet; pneumatic chip loader; loading rate 600 tons per hour; shipment of chips; owned and operated by Louisiana-Pacific Corp.

Crown-Simpson Wharf: 0.95 mile S of Louisiana-Pacific Chip Wharf; 500 feet long, 700 feet of berthing space with dolphins; 31 feet alongside; deck height, 15 feet; receipt of petroleum products, shipment of pulp; owned and operated by Crown-Simpson Pulp Co.

Olson Terminal Wharf (40°44'00"N., 124°13'06"W.): 600 feet long; 30 feet alongside; shipment of lumber and logs; owned and operated by Olson Terminal.

Pacific Dock (Kramer Terminal Dock): 0.6 mile S of Olson Terminal; 18 to 26 feet alongside; in 1973, dock not being used for any commerce due to extreme shoaling.

Supplies.–Humboldt Bay has no facilities for bunkering deep-draft vessels. Provisions, water, and marine supplies are available.

Repairs.–Repair facilities for large vessels are not available in Humboldt Bay. Complete hull and engine repairs are available for small craft. The largest marine railway, located on the W side of the channel opposite Dock A, can handle craft up to 300 tons, 110 feet long, 24 feet wide, and with a 12-foot draft.

Small-craft facilities.–Berths for over 500 small craft with electricity and water are available at the City Boat Basin (40°48'14"N., 124°10'36"W.): additional berthing space is available at marinas on Fields Landing and behind Buhne Point. Gasoline, diesel fuel, marine supplies, and launching ramps are available at several places in Humboldt Bay.

Chart 18620.–N of the entrance to Humboldt Bay, the coast consists of sand dunes partly covered with timber for 11 miles to the mouth of **Mad River.** The first 7 miles forms the W shore of Humboldt Bay, and then the land behind the dunes is low and marshy as far as the river.

From the mouth of Mad River, the sand dunes are 20 to 60 feet high and continue for 5.5 miles to **Little River,** a small shallow stream. The N point at the mouth of the stream is rocky, and from this point the coast consists of rocky cliffs extending beyond Trinidad Head.

A U.S. Coast Guard Air Station is at McKinleyville about 2.5 miles N of the mouth of Mad River.

Chart 18605.–**Little River Rock,** 126 feet high, is 0.8 mile NW of the mouth of Little River, and 0.3 mile offshore. Several rocks and foul ground are between it and the beach, and a rock 4 feet high is about 100 yards NW.

From Little River Rock to Trinidad Head, the shore is bordered by numerous rocks and ledges extending 0.3 mile offshore.

Pilot Rock, 93 feet high, is 0.5 mile S of Trinidad Head. It is of small extent, conical, and whitish in color, rising abruptly from depths of 48 to 50 feet on all sides. Pilot Rock is marked on its W side by a gong buoy.

Trinidad Head is nearly 39 miles NNE of Cape Mendocino and 17.5 miles N of the entrance to Humboldt Bay. It rises to a height of 380 feet. The sides are steep and covered with chaparral. From N or S the head is generally raised as a dark, round-topped island. Near the N end it is joined to the mainland by a narrow neck, from the S side of which **Little Head,** a rocky knoll 125 feet high, projects into Trinidad Harbor. The white cross 200 yards N of the S point of Trinidad Head is fairly prominent.

Trinidad Head Light (41°03.1'N., 124°09.0'W.), 196 feet above the water, is shown from a 25-foot white pyramidal tower near the SW side of the head. A lighted whistle buoy is 1 mile W of the head. A radiobeacon is about 280 yards NNE of the light. A fog signal is at the light.

Trinidad Harbor, a small cove E of Trinidad Head, affords shelter in NW weather, but is dangerous in W or S weather. The cove is small and is further constricted by several rocks, and, as a rule, there is always a swell even in N weather. It is used by fishing boats to a considerable extent during the summer, even though the holding ground is only fair. A white lighthouse structure, a memorial containing the original oil-burning light used at Trinidad Head until 1948, is at the center of the bluff on the N side of the harbor. A pier with a fishhouse is in the bight W of Little Head. Fish are unloaded at the pier and are trucked to Eureka and San Francisco. A small marine railway near the foot of the pier is used for launching and retrieving small craft up to 26 feet long and 9 feet wide. Gasoline and ice are available at **Trinidad,** a village on the N shore of the cove.

Prisoner Rock, 220 yards E of Trinidad Head, is 42 feet high and the most prominent of the rocks in the cove. It consists of two rocks so close together that they are usually taken for one. From S they resemble an animal lying down with its head toward the W. A rock covered 7 feet is 150 yards NNW from them.

Flat Rock, low and small, lies 350 yards ENE from Prisoner Rock; a rock covered 5 feet lies 150 yards SSE from it. A bell buoy is 175 yards W of a rock covered 9 feet, which lies 400 yards SSE of Prisoner Rock.

The best anchorage is in 42 feet, muddy bottom, about halfway between Prisoner Rock and Trinidad Head, with Flat Rock, bearing 073°, just open S of Prisoner Rock. A **special anchorage** is on the E side of Trinidad Head. (See 110.1 and 110.127c, chapter 2, for limits and regulations.)

Blank Rock, 111 feet high, lies 0.3 mile W of Trinidad Head. Foul ground is between it and the head. A smaller rock is 150 yards N of Blank Rock. A rock awash and a ledge covered 15 feet are 275 yards SSE of Blank Rock.

Flatiron Rock, 72 feet high, lies 0.3 mile NW of Blank Rock. It is considerably larger than Blank Rock, with two rocky heads of about the same height. A covered rock lies 300 yards off its SW face, and numerous ledges extend SE toward the head.

Chart 18600.–From Trinidad Head for 5.5 miles to Rocky Point, the coast is rocky, with numerous outlying islets and ledges extending as much as 1.2 miles offshore and cliffs reaching elevations of over 100 feet. The mountains back of Trinidad Head are good landmarks for vessels approaching from seaward. N of Rocky Point, the beach is low and sandy, with several lagoons behind it, for nearly 11 miles to the S end of the Gold Bluffs. From this point to Point St. George, the coast is rocky, the cliffs being from 100 to 500 feet high and bordered by numerous rocks. The Klamath River breaks through the cliffs 16 miles S of Point St. George. From Point St. George for 65 miles to Cape Blanco, the coast trends in a general NW direction with a shallow bight known as Pelican Bay immediately N of Point St. George. The beach is fringed by numerous rocks and ledges, but, with the exception of St. George, Rogue River, and Orford Reefs, these in general do not extend over a mile from shore. The 30-fathom curve follows the general trend of the coast, and in thick weather may be considered as the limit inside of which it is unsafe to approach, but in the vicinity of St. George, Rogue River, and Orford Reefs, the depths should not be shoaled to less than 50 fathoms.

Green Rock, 108 feet high and of small extent, lies 1.5 miles N of Trinidad Head and nearly 600 yards offshore. The top is covered with grass. Numerous rocks lie inshore, and a rock awash lies 700 yards W of it. A rock covered 3 fathoms lies 0.5 mile W of Green Rock. It seldom breaks and rises abruptly from 15 fathoms. Two covered rocks lie 0.5 and 0.8 mile NNE of Green Rock.

White Rock, 118 feet high, lies 1.9 miles N of Trinidad Head. It is of small extent and is 250 yards off a wooded projecting head about the same height. Another rocky islet 129 feet high is 1 mile N of White Rock.

Cone Rock, 17 feet high, is 3.8 miles N of Trinidad Head and over a mile offshore. It is conical in shape and of small extent. A smaller rock, 15 feet high, lies 0.5 mile E.

Turtle Rocks, two rocks of small extent 20 and 29 feet high, are 1.5 miles N of Cone Rock and abreast of Rocky Point. E of Turtle Rocks the ground is foul, with two breakers 600 and 800 yards from the outer rock and numerous visible rocks extending to the beach. A bell buoy is 0.5 mile W of Turtle Rocks.

Rocky Point, 5.5 miles N of Trinidad Head, is a bold feature with cliffs about 200 feet high, bordered by numerous rocks and ledges extending 200 to 300 yards offshore. The point is covered with oak and scrub pine for 0.5 mile back to the redwood forest; through this oak growth two rocky pinnacles about 250 feet high are visible.

Rodgers Peak, 2,800 feet high and 6.3 miles E of Rocky Point, is heavily wooded and easily identified.

N of Rocky Point the cliffs are succeeded by a low sandy beach for 4.5 miles to the N end of **Big Lagoon,** which is immediately behind the sand beach. Above Big Lagoon the cliff formation is resumed and extends 2 miles to **Stone Lagoon.**

Sharp Point, 6.2 miles N of Rocky Point, is a sharp-pointed conical rock cliff about 400 feet high. Its light-gray color makes it readily distinguishable for a distance of 15 miles in clear weather from any direction. The beach in this area is bordered by numerous rocks extending about 0.8 mile offshore.

Gold Bluffs, a 9-mile stretch of gravel and sand 100 to 500 feet high, begin about 9 miles N of Rocky Point. The S part is comparatively low and bordered by several outlying rocks; in about the middle the buffs are broken by two valleys.

Mussel Point, 11.2 miles N of Rocky Point, is a light gray cliff about 300 feet high, with a small, flat top distinguishable at 10 to 12 miles in clear weather.

Reading Rock, 94 feet high and of small extent, is 4.5 miles offshore W of Mussel Point. It is dark for about one-third the height and white above with a cleft on the S face. It rises abruptly from depths of 20 fathoms and can be approached close-to with safety. It is marked by a light, 98 feet above the water, shown from a house with a red and white diamond-shaped daymark; a fog signal is at the light.

N of Gold Bluffs the coast becomes rocky, irregular, and broken, the bold cliffs being bordered by many rocks.

A yellow clay slide extending from the top of a 900-foot slope to the beach is 9 miles N of Mussel Point. It is sharp at the top, broad at the base, and the highest and most prominent of the bluffs in that vicinity. It may be seen in clear weather for a distance of 15 to 18 miles.

Split Rock is a slightly projecting head 3.5 miles N of the N end of Gold Bluffs; it is so named because of the cut on the N face.

High Bluff is a slightly projecting head 0.8 mile N of Split Rock. It is prominent because of an enormous split or chasm on its N face; at the S edge of the cut the bluff is 340 feet high.

White Rock, 107 feet high, lies 600 yards N of High Bluff and 300 yards offshore. Numerous rocks, covered and visible, lie between it and the beach. Its S face is very precipitous, and its W face is steep, sloping N. It can be distinguished by its color for several miles.

Flint Rock Head, 177 feet high, is a detached rocky head connected with the cliffs by a low sandspit. It is at the S end of the Klamath River sand beach, 1.8 miles N of Split Rock. Its SW face is precipitous. A rock awash lies 0.6 mile NW from Flint Rock Head and 0.5 mile offshore.

Klamath River mouth is 16 miles S of Point St. George and 30 miles N of Trinidad Head. It is a large river draining an extensive mountainous area. Local boats carry 2 to 3 feet into the river. The bar changes frequently, and local knowledge is essential to make the entrance. The entrance is seldom used, but there is small-craft traffic on the river. There are several float landings where sport fishing craft berth. Gasoline, water, ice, launching ramps, and marine supplies are available.

The coast highway crosses the river at **Klamath,** a small town 2 miles inland. A fixed highway bridge, 3 miles above the mouth, has a clearance of 13 feet.

Requa, a small village on the N shore of the river just inside the mouth, has a hotel and landings for sport fishing boats. Marine supplies, gas, ice, outboard repair, and launching ramps are available at Requa.

Red Mountain, 8 miles E of the mouth of Klamath River, is visible for about 60 miles in clear weather.

From the mouth of the Klamath River the coast curves NW for 3 miles to the mouth of **Wilson Creek,** The cliffs are high, irregular, and jagged, and the hills above are covered with grass and chaparral. Numerous rocks extend about 300 yards offshore.

A covered rock 0.6 mile offshore is 1.4 miles NW of the mouth of Klamath River. A rock, 37 feet high, is 1 mile offshore, 2.6 miles NW of the mouth of Klamath River, and about 1.5 miles S of Wilson Creek.

False Klamath Rock, 203 feet high, reddish, and round-topped, is the most prominent rock on this part of the coast. It lies 650 yards W of the S point of the small cove into which Wilson Creek empties. **Wilson Rock,** covered 2½ feet, is 0.5 mile W of False Klamath Rock. A rock awash is 0.9 mile NW of False Klamath Rock. Numerous covered rocks lie E and NE of the line from this rock to another rock, 37 feet high, S of False Klamath Rock.

From False Klamath Rock for 7 miles N the coast consists of bold rocky cliffs, much broken and bordered by numerous covered and exposed rocks. Beyond these, extending 3 miles to Crescent City, is a broad sand beach backed by flat cultivated land.

Midway Point, 4 miles N of False Klamath Rock, is bold, rising to a height of 820 feet, 800 yards from the beach.

Sister Rocks, a cluster of prominent rocks, 0.5 mile W of Midway Point, consist of three large and several smaller rocks covering a limited area; the outer one is 69 feet and the inner one 72 feet high.

Chart 18603.–Crescent City Harbor, protected by breakwaters, is midway between San Francisco Bay and the entrance to Columbia River. Commercial and sport fishing boats operate out of the harbor. Waterborne traffic in the harbor is in the receipt of gasoline and fuel oils. **Crescent City** is on the N side of the harbor.

Crescent City Outer Breakwater Light 5 (41°44.2'N., 124°11.4'W.), 55 feet above the water, is shown from a white steel column with green square daymarks at the seaward end of the W breakwater. A radiobeacon and fog signal are at the light. The tower of an abandoned lighthouse is on the islet S of **Battery Point.** The entrance to the harbor is marked by a lighted range and by buoys.

The entrance range should not be followed past a point approximately abeam of Whaler Island, as it leads close to the end of the breakwater extending N from this island.

COLREGS Demarcation Lines.–The lines established for Crescent City Harbor are described in 80.1275, chapter 2.

Depths of about 20 feet can be taken into the outer part of the harbor, thence about 13 feet to the long wharf on the W side of the harbor, and about 12 feet to Fishboat Harbor in the E part; the chart is the best guide.

The W breakwater gives good protection from NW winds for vessels anchored in the outer harbor, but the harbor is open to the S. Fishboat Harbor provides excellent anchorage for small craft.

Vessels anchored in the harbor should take precaution against a local SE wind known as the **kick back** or **back draft,** which frequently blows with considerable violence. This wind follows only periods of strong NW winds outside. It usually starts in the early afternoon and ends about midnight.

Caution should be exercised in approaching Crescent City Harbor because of the many rocks and shoals. **Chase Ledge,** covered 21 feet, lies 0.9 mile S of Round Rock. **Mussel Rock,** only a few feet high, is 0.6 mile SE of Round Rock; a rock covered 7 feet, 700 yards to the S, breaks only in a heavy swell. Other covered rocks extend N to Whaler Island. Foul ground with many bare and covered rocks extends nearly a mile offshore along the low but rocky coast NW of Crescent City Harbor for 3.5 miles to Point St. George. This area should be avoided.

The long wharf in the W part of the harbor is used by fishing vessels to offload fish. The remains of two other wharves, just E, were almost completely wiped out by the seismic sea wave which struck the harbor following the March 27, 1964, Alaska earthquake. The seismic wave caused considerable damage and changes to the harbor shoreline.

Fishboat Harbor is formed by the inner breakwater extending NW from **Whaler Island** and the sand barrier from that island to the E shore. Citizens Dock, the Y-shaped pier at the N side of the harbor, extends out to a depth of about 13 feet. Several fishhouses are on the pier. Fishing boats unload their catch along both of the outer spurs of the pier. Water is piped to the pier, and ice is delivered by truck. Gasoline and diesel fuel are available. Many mooring floats for commercial fishing boats are in Fishboat Harbor. Berths with electricity, gasoline, diesel fuel, water, ice, a pump-out station, a launching ramp, and marine supplies are available.

A **harbormaster** with an office at Fishboat Harbor is in charge of assigning berths. He maintains a radio watch on VHF-FM channels 9 (156.45 MHz) and 16 (156.80 MHz), Monday through Friday from 0500 to 2100.

A trailer carriage at Fishboat Harbor can handle craft up to 55 feet. Hull and engine repairs are available from several local firms.

A Coast Guard vessel is stationed in Fishboat Harbor.

A small-craft basin for about 200 boats is just N of Citizens Dock. In 1976, the controlling depth was 13 feet in the entrance channel, thence in 1973, depths of 12 feet were reported in the basin.

Castle Rock, 2.3 miles NW of Battery Point and 0.5 mile S of the S point of Point St. George, has a rather flat top, with a small knob near the E edge.

Point St. George, 3 miles NW of Battery Point, is low with several irregular and rocky hillocks near the beach. The seaward face is about a mile long in a NW direction, with sand dunes and low land immediately behind it. The tree line is about 0.6 mile inland, with a few trees near the S end of the point. Numerous conspicuous rocks fringe the point up to 0.5 mile offshore. **Brown Rock,** 28 feet high, is near the outer end of the exposed rocks extending NW from the point.

St. George Channel, over a mile wide, is clear between the visible rocks fringing Point St. George and the E rocks of St. George Reef. It is frequently used in clear weather by coastwise vessels.

St. George Reef is composed of rocks and covered ledges extending 6.5 miles NW and W from Point St. George. Nine visible rocks are in the group.

St. George Reef Lighted Horn Buoy SG (41°50.2'N., 124°23.8'W.), replacing St. George Reef Light, is a large navigation buoy (LNB), about 1 mile W of **Northwest Seal Rock** and Little Black Rock, the outermost rocks of St. George Reef. The buoy is red, shows a light 42 feet above the water, and is equipped with a radiobeacon and a fog signal.

Star Rock, the SE rock of the group, is 64 feet high. It is 1.7 miles W of the S tip of Point St. George. Between Star and Northwest Seal Rocks are three rocks, **Hump Rock, Whale Rock,** and **Southwest Seal Rock,** almost in line, varying in height from 18 to 45 feet. S of these visible rocks are two covered ledges, **Mansfield Break,** and **Jonathan Rock.** The latter is 2.5 miles NW of Star Rock and 3.2 miles SE of Northwest Seal Rock. It breaks only in a heavy swell, and not continuously then; deep water surrounds it. Mansfield Break lies 2.3 miles S of Northwest Seal Rock and nearly 3.5 miles NW of Star Rock. It is about 100 yards in extent, with 20 fathoms close-to and around it.

Great Break, 0.5 mile SE of Southwest Seal Rock, is about 150 yards in extent. A covered ledge that breaks at low water is 125 yards SW of Southwest Seal Rock.

Dragon Channel, which leads N of Jonathan Rock and between Mansfield Break and Great Break, is not recommended.

East Rock and **Long Rock** are 2.1 and 1.6 miles, respectively, N of Star Rock. On this line, and 1 mile N from Star Rock, is a rock visible at lowest tides; 0.3 mile SE from this rock is a rocky patch covered 15 feet, in which a rock covered 5 feet has been reported.

Flat Rock lies nearly midway between Long and Whale Rocks, and about 0.6 mile from the former. **Mussel Rock** is nearly 0.5 mile W of Long Rock; a covered ledge showing a breaker is 200 yards N of the rock. A covered rock that breaks in moderate swells is 330 yards NE of Hump Rock.

All the rocks of St. George Reef rise abruptly; soundings made in the vicinity give no warning of their presence. In thick weather, the greatest caution should be observed and the reef given a wide berth.

Chart 18600.–For about 10 miles N of Point St. George, the shores of **Pelican Bay** are composed of sand dunes, with a broad beach extending to the mouth of **Smith River. Lake Talawa** and **Lake Earl** are surrounded by low marshy land behind this stretch of dunes.

A small rock about 10 feet high is 1.8 miles S of the mouth of Smith River, and nearly 0.5 mile offshore. A cluster of three low rocks is nearly a mile offshore and 0.9 mile NNE of the 10-foot rock.

Chart 18602.–From Smith River for 3.2 miles to the California-Oregon boundary, the coast is composed of low rocky cliffs, bordered by numerous rocks and ledges, covered and awash, and backed by a low narrow tableland. Several prominent rocky knolls rise from 100 to 200 feet above this tableland.

Pyramid Point, a rocky knoll 213 feet high, marks the N point of Smith River.

Prince Island, of small extent and 171 feet high, lies 0.1 mile offshore abreast Pyramid Point. **Hunter Rock,** 177 feet high, double-headed and somewhat smaller, is 0.3 mile N of Prince Island. Several other smaller rocks are in the vicinity.

Cone Rock, 1.3 miles N of Prince Island and 0.6 mile offshore, is the most prominent of the visible dangers in this vicinity. It is 68 feet high and of small extent.

9. CHETCO RIVER TO COLUMBIA RIVER, OREGON

This chapter describes 200 miles of the Oregon coast from the mouth of the Chetco River to the mouth of the Columbia River. Also described are the Chetco and Rogue Rivers, Port Orford, Coquille River, Coos Bay, Umpqua and Siuslaw Rivers, Yaquina Bay and River, Nehalem River, and Tillamook Bay. The cities of Coos Bay and North Bend on Coos Bay and Newport on Yaquina Bay are the only deep-draft ports on the Oregon coast. The principal dangers are unmarked Rogue River Reef, and Orford Reef, which is marked by a light.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1305 through 80.1360, chapter 2.

Weather.–Fog and rain are the major weather headaches to the mariner along the Oregon coast. Summer and early fall bring light winds, mild temperatures, clear or partly cloudy skies, and frequent fog. While fog is a problem all along the coast, its frequency increases as you head S. Around Astoria, visibilities drop below 0.5 mile on 4 to 6 days per month from August through October. At North Bend, this happens on 6 to 13 days per month from July through December. August is usually the worst month. Fog is thickest at night and in the morning. Conditions often improve by midafternoon, when skies clear or become partly cloudy. Temperatures climb into the midsixties in summer and low sixties in fall. At night, they drop into the low fifties in summer and midforties in autumn. Winds are generally light in summer and early fall. Northwesterlies and southwesterlies through southerlies are frequent, the latter becoming increasingly so in fall. Winds at North Bend on Coos Bay are an exception, and strongest in June, July, and August. They blow at 17 knots or more 15 to 20 percent of the time and at 28 knots or more 1 to 2 percent of the time.

Rain (0.1 inch or more) falls on less than 10 days per month from May through September. It becomes more frequent in October and reaches a peak in January, when 15 to 20 rainy days occur on the average. Snow is uncommon, since temperatures are usually mild. Winter temperatures reach the low fifties during the day and fall into the upper thirties at night; extremes have dipped into the low teens. Fog can occur in winter with fronts or under rare clear skies; it is more likely in early winter. Winter and spring winds are moderately strong, particularly S of Newport. From North Bend southward, winds reach 17 knots or more about 5 to 15 percent of the time and 28 knots or more about 1 to 3 percent of the time. Extreme wind speeds usually occur in either winter or early spring, and have climbed to around 50 knots. They are most common from a S direction. Winter winds along the entire coast are generally out of the SE through S. Northwesterlies are also common. It is not until May that these directions switch roles and northwesterlies become more or as frequent. Spring warming is also a slow process. By April, temperatures are about 4° to 7° above January levels.

Charts 18602, 18600.–From the California-Oregon boundary for 3.8 miles to Chetco River, the coast is composed of low rocky cliffs, bordered by numerous rocks and ledges, covered and awash, and backed by a low narrow tableland. Several prominent rocky knolls rise from 100 to 200 feet above this tableland. Due to the numerous dangers, the coast should not be approached closer than 1.5 miles.

Chetco Cove, 15.5 miles N of Point St. George, affords some protection from NW winds, but is exposed in S weather. **Chetco Point** marks the NW side of the cove. There are numerous visible and covered rocks fringing the shore of the cove and its approaches. The smokestack of a plywood plant in **Brookings** is very prominent for several miles off the entrance to Chetco River. **Chetco River** empties into the N side of the cove. The river is entered through a dredged channel which leads between two stone jetties to the **Port of Brookings** turning basin, about 0.3 mile above the jetties. The turning basin and a small-craft basin just N of it are protected to the W by a 1,800-foot-long dike. Another small-craft basin is about 250 yards SE of the turning basin. A barge slip, just E of the turning basin, is at the N side of the mouth of the entrance channel to the lower small-craft basin. The river entrance channel is marked by a **030°** lighted range and other aids; a light and fog signal are off the outer end of the N jetty. In May-August 1981, the midchannel controlling depth was 13 feet to the turning basin, thence in May 1981, depths of 10 to 12 feet in the basin except for shoaling to 8 feet along the W limit, thence in February 1981, 8 feet to the head of the upper small-craft basin. In July 1979, the entrance channel leading to the lower small-craft basin had a midchannel controlling depth of about 9 feet. It was reported, in July 1979, that a depth of about 14 feet was available in the barge slip, and a depth of about 13 to 14 feet was alongside the floats in the lower small-craft basin. In Chetco River, depths of about 2 feet can be carried to the highway bridge about 0.7 mile above the jetties. An overhead power cable crossing the river about 0.6 mile above the jetties has a clearance of about 46 feet. The highway bridge has a clearance of 59 feet.

COLREGS Demarcation Lines.–The lines established for the Chetco River are described in 80.1305, chapter 2.

A Coast Guard station is on the E side of the river 450 yards inside the entrance. A radiobeacon is at the station. A lookout tower atop a building at the station is used to observe the bar during heavy weather. The Coast Guard has established a **rough bar advisory sign,** 34 feet above the water, visible from the channel looking seaward, on the N end of the Coast Guard boathouse, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, and with the words "Rough Bar" in black letters. The sign is equipped with two quick flashing amber lights that will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

Lumber is loaded on barges at the barge slip just E of the turning basin. The upper and lower small-craft basins are used primarily by commercial fishing boats and pleasure craft. The upper basin has over 500 berths, most with electricity; gasoline, diesel fuel, water, ice, and marine supplies are available. Berths with electricity and water are reported to be available in the lower basin. Minor engine repairs can be made at the upper small-craft basin; a 15-ton crane here can be used by the public in emergencies.

Storm warning signals are displayed. (See chart.)

From Chetco Cove for 4.5 miles to Cape Ferrelo, the coast is composed of high broken cliffs, bordered by numerous rocky islets and ledges extending, in some cases, over 0.5 mile offshore.

Goat Island, locally known as Bird Island, is 1.9 miles NW of Chetco Point and 500 yards offshore. It has deep water off its W and SW faces, but rocks and foul ground extend 350 yards S from the SE point. The island is readily identified; its profile closely resembles that of Prince Island off Pyramid Point.

Cape Ferrelo, 4.4 miles NW of Chetco Point, is the prominent headland N of St. George Reef and, though not projecting seaward to any extent, is conspicuous because of its bold, rugged face. Several rocks and islets lie up to 0.5 mile directly off the cape.

From Cape Ferrelo for 9.5 miles to Crook Point, the coast is very rugged and rocky, with several large and prominent islets and reefs extending well offshore. In some cases, these form anchorages for small vessels in N weather.

Whalehead Island, the outer of two rocky islets 2.3 miles N of Cape Ferrelo, is 107 feet high. The inner of the two islets is 128 feet high. A rock awash lies 800 yards S of the highest point of the island.

A rugged cliff from 200 to 300 feet high is 3.3 miles N of Cape Ferrelo. The face is about 1 mile long, and behind it rises a treeless triple-headed hill to heights of 700 to 800 feet.

Thomas Creek, 3.7 miles N of Cape Ferrelo, is crossed by the highest bridge in Oregon; the bridge stands 345 feet above the creek.

Leaning Rock, 49 feet high, is 0.5 mile offshore and 3.5 miles N of Whalehead Island. It has a perpendicular face on its NW side and slopes gradually SE. Several other rocks are near it.

Between Whalehead Island and Crook Point are two prominent grassy areas in the forest near the crest of the hills about 2 miles apart and situated at an elevation of nearly 2,000 feet; the S one is known as **Rocky Prairie.**

Yellow Rock, 84 feet high, is 4.5 miles N of Whalehead Island and 0.5 mile offshore. The rock is yellowish in color and can be recognized from 4 miles offshore.

Bosley Butte, 8.5 miles NE of Cape Ferrelo, shows above the coast ridges from the W and NW as flat-topped with two summits separated by a slight depression. The NE summit is rounded and somewhat larger, but is slightly lower than the E summit.

Mack Arch is a double-headed rocky islet 0.8 mile offshore, 1.5 miles S of Crook Point and 8 miles NNE of Cape Ferrelo. The W head is 231 feet high and the E a little lower; both are black to near the summits, which are generally white from bird droppings. The arch, about 100 feet high, is under the E summit and shows prominently from S. A rock awash lies 125 yards S of the E point.

The bight to the ESE of Mack Arch has been used as a temporary anchorage during moderate NW weather. The rocks and reefs break the swell. In approaching the anchorage, pass to the S of Mack Arch about midway between it and Yellow Rock. Anchor in 11 fathoms, sand bottom, with Mack Arch bearing 296° and Yellow Rock bearing 155°. No breakers have been observed, but caution should be exercised as the place has not been closely surveyed.

Mack Reef extends from Mack Arch to Crook Point and comprises many rocks, visible or sunken, varying in height from awash to 133 feet. From S these rocks stand out conspicuously when seen against the white sand dunes N of Crook Point. Mack Arch, because of its size and height, is the most prominent.

Mack Arch Cove lies immediately E of Mack Reef and affords fair shelter in NW weather in 6 to 7 fathoms, sandy bottom. In entering from S, pass E of Mack Arch, giving it a berth of about 150 yards, but taking care to avoid the rock 125 yards S of its E point. Then bring the 125-foot rock, in the N part of the reef, to bear 352° and steer for it on that bearing until up to the anchorage abreast the group of rocks 0.5 mile N of Mack Arch.

Crook Point is moderately low, but terminates seaward in a rocky knoll 175 feet high, with a slight depression immediately behind it. The rocks close to the point often show up during moderately thick weather; several have a very noticeable pinnacle formation.

From the vicinity of Crook Point to the mouth of the **Pistol River** are sand dunes which show up prominently in clear weather and distinctly mark this section. In thick weather these dunes are not readily distinguished. From the mouth of the river to Cape Sebastian are numerous rocks and rocky islets extending 0.3 mile offshore, reaching in some cases a height of 150 feet. The Pistol River bar opens in the rainy season; its location varies from year to year.

Hunters Cove, a small, constricted anchorage under the SE face of Cape Sebastian, is formed partly by the cape and partly by **Hunters Island** in the entrance. The island is 0.2 mile in extent, rocky, flat-topped, and 113 feet high. Shoal water extends from it E to the beach. The cove is used occasionally by launches and small craft. During strong NW weather the sea at the entrance is rather lumpy for small boats. With moderate SW weather a heavy sea piles up across the entrance between the cape and Hunters Island.

Charts 18601, 18589.–Cape Sebastian, 33.5 miles N of Point St. George, is conspicuous from either N or S. It is the seaward termination of a ridge transverse to the coast, and rises abruptly from seaward to a height of 694 feet, with a depression behind it, and then more gradually to a height of about 2,000 feet. The seaward face is precipitous and broken, and has a few trees; southward the lower part is grass covered. A rock covered 1¾ fathoms that seldom breaks is 0.5 mile offshore, 0.9 mile NW of the W extremity of the cape.

From Cape Sebastian for 6 miles to the mouth of Rogue River, the coast is considerably broken, quite rugged, and low near the beach, and has a few outlying rocks.

The outer of three exposed rocks off the entrance to **Hunter Creek,** 3.7 miles N of Cape Sebastian, lies nearly 0.5 miles offshore.

Rogue River, 6 miles N of Cape Sebastian, is an important sport fishing stream. Several float landings and a hoist for trailer-drawn craft are just above the old lumber dock on the N side of the river near the mouth. **Gold Beach,** on the opposite side of the river from **Wedderburn,** is the larger town. Several wharves and piers here are used for mooring and offloading fish. The entrance to Rogue River is protected by stone jetties; buoys mark the approach. A seasonal light and fog signal are on the seaward end of the NW jetty. A Federal project provides for a 13-foot channel from the ocean to a turning basin of the same depth at Wedderburn. (See Notice to Mariners and latest editions of charts for controlling depths.)

Caution.–The controlling depths in Rogue River channel and basin are usually considerably less than project depth and are subject to continual and pronounced change; vessels are advised not to enter the river without local knowledge.

The Coast Guard has established a seasonal **rough bar advisory sign** on the N side of the river about 20 feet above the water, visible from the entrance to the small-boat harbor at Gold Beach, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, with the words "Rough Bar" in black letters. The sign is equipped with two quick flashing yellow lights that will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

COLREGS Demarcation Lines.–The lines established for the Rogue River are described in 80.1310, chapter 2.

About 170 berths, some with electricity, gasoline, diesel fuel, water, ice, launching ramps, and marine supplies, are available in Gold Beach. A repair facility here specializes in aluminum hull repairs, but also makes minor engine repairs.

The wreck of a fishing vessel is charted on the SE edge of the dredged channel about 210 yards W of the end of the SE jetty; the position is doubtful.

A concrete arch highway bridge across Rogue River, 0.8 mile above the mouth, has a fixed span with a clearance of 30 feet. An overhead power cable with a clearance of 77 feet crosses the river about 0.2 mile E of the highway bridge. The bridge is prominent when off the mouth of the river. (See 207.655, chapter 2, for special logging regulations.)

The N head at Rogue River entrance that reaches a height of 700 feet a mile N of the river, the marked depression in the coast range made by the river valley, and the rocks of Rogue River Reef are prominent from seaward.

Storm warning signals are displayed. (See chart.)

Rogue River Reef, extending over 4 miles NW from Rogue River entrance, includes many visible and covered rocks; because of the broken bottom, vessels should stay over 5 miles offshore when passing this area. A 0.5-mile-wide channel separates the reef from the beach, but it is not safe to use without local knowledge. **Northwest Rock,** 4 miles NW of Rogue River entrance, is the outermost visible rock of the reef. A rock, covered 2½ fathoms, is 0.3 mile W of Northwest Rock. **Needle Rock,** 1.1 miles SE of Northwest Rock, is the most prominent of the rocks in the reef; the needle is on the S side.

N of Rogue River the coast trends N for 10 miles and then NW to Cape Blanco. The mountains are high, irregular, dark, and covered with chaparral. The beach is bordered by numerous rocks for 5 miles, then is comparatively clear with the exception of Orford and Blanco Reefs.

A group of covered and visible rocks, 1 mile long and 0.5 mile wide, lies 5 miles N of Rogue River and nearly 2 miles offshore; these rise abruptly from 12 fathoms. **North Rock,** 7 feet high, is the largest and nearest to the beach. A rock, covered 1¼ fathoms, lies about 0.6 mile NW of North Rock.

The channel between Rogue River Reef and the mainland, and North Rock and the mainland, is sometimes used by coastwise freighters in clear weather. This channel should not be attempted by strangers.

Brushy Bald Mountain, nearly 9 miles NE of Rogue River entrance and 3 miles inland, shows up in hazy weather as a flat rounded peak, with a gentle slope from a W and S direction.

Sisters Rocks are a group of three rocky islets 10.5 miles N of Rogue River entrance. The smallest, 0.8 mile offshore, is the outermost. There is fairly smooth water in NW weather under the lee of the largest islet.

Colebrooke Butte, 2 miles E of Sisters Rocks, appears from the W as a cone with gentle sloping sides. The upper part usually shows against the skyline and is readily recognized. From the S, it shows as a rounded peak which resembles Brushy Bald Mountain, though it is somewhat lower. The N part of the summit is tree covered and dark green, and the S part is grass and brush covered and light green. The slopes are timbered except for the lower part of the seaward slope, which is bare and brown.

Lookout Rock, 2.3 miles N of Sisters Rocks, is a prominent projecting cliff, with a marked depression behind it. The seaward face is precipitous.

Bald Mountain, 3.2 miles NE of Lookout Rock, appears from offshore as an irregular knob at the NW end of a long ridge. **Rocky Peak,** on the SE end of the ridge, is a sharp conical peak. From a SW direction, three peaks or knobs show; from a NNW direction, two peaks show almost in range. These peaks were used by the early navigators as a landfall for Port Orford in coming from the N.

Prominent **Humbug Mountain,** 3.3 miles N of Lookout Rock and 4 miles S of Port Orford, is conical in shape, and its seaward face is steep and rugged.

Chart 18589.–Island Rock, 1.3 miles off the seaward face of Humbug Mountain, is flat on top. A needle rock is 200 yards off its NW end. These rocks are prominent when approaching Port Orford from S. Except for two small rocky patches, covered 6¾ and 10 fathoms, within 0.5 mile of the N end of Island Rock, there is deep water around these islands and between them and the beach.

Redfish Rocks are a group of islets covering an area 0.5 mile square, lying 2 miles N of Island Rock and nearly 1 mile offshore. They are six in number and range from 10 to 140 feet in height. Many covered rocks lie within this area.

Port Orford, 6.5 miles S of Cape Blanco and 19 miles N of Rogue River, is a cove that affords good shelter in NW weather, but is exposed and dangerous in S weather. It is easy of access and is probably the best natural NW lee N of Point Reyes.

The town of **Port Orford,** on the N side of the cove, is the home of the famous yellow cedar; lumber is trucked from the town.

Storm warning signals are displayed. (See chart.)

The Heads, forming the W point of the cove, appear from S as a long ridge with three knobs. The inner two are slightly higher and covered with trees. **Tichenor Rock** lies 175 yards S of The Heads. The white lookout tower on The Heads is prominent from S and is reported to be mistaken at times during the day for Cape Blanco Light tower. The white tank on the summit of The Heads shows just clear of the nearby trees; it also resembles Cape Blanco Light tower when observed from far offshore.

The tank and tower are on the site of a former Coast Guard station; the station is now inactive.

Klooqueh Rock, 0.3 mile off the NW face of The Heads, is black and conical in shape. It is prominent, especially when coming from the NW inside Orford Reef. Rocky ledges are between this rock and shore.

Anchorage may be had in about the center of Port Orford in 6 to 10 fathoms, sand bottom, however, it is reported that many anchors have been lost near the rocky 2½-fathom shoal 0.2 mile E of the S end of the breakwater. The cove is marked by a lighted bell buoy and a lighted buoy, 0.5 mile S and 0.8 mile ENE of Tichenor Rock, respectively. Small craft may anchor closer to The Heads where better protection is afforded against the NW winds, which sweep with considerable force through the depression at the head of the cove.

Battle Rock, in the N part of the cove close to shore, is high, narrow, and black; it is detached only at extreme high tides. Visible and covered rocks extend up to 0.5 mile from shore around the cove, but a passage with a least depth of 1 fathom is available through the center of the cove to the wharf E of **Graveyard Point.** A 550-foot breakwater extends SE from the point.

Depths of 5 to 9 feet are alongside the outer E face of the wharf; depths are shoaler inshore, and a 3-foot depth is about 20 yards E of the wharf. Gasoline, diesel fuel, and water are piped to the wharf; fishing boats to 11½ tons, 37 feet long, and 13½ feet wide are lifted to cradles on the wharf by a hoist. A shrimp packing plant is on the wharf and a launching ramp is W of the wharf. Marine supplies can be ordered from Coos Bay, 51 miles by highway.

From The Heads for 6.5 miles to Cape Blanco, the coast extends in a general NNW direction. N of The Heads the shore is a narrow sand ridge, rising at one point to 160 feet, covered with grass, fern, and brush, and ending abruptly nearly 3 miles from The Heads at the edge of the Elk River Valley. N of this point are sand dunes extending to the mouth of **Elk River,** a small unimportant stream. Beyond the mouth of Elk River to Cape Blanco, the coast consists of vertical cliffs, wooded to the edge, and in some places over 150 feet high.

Orford Reef, from 2 to 5 miles offshore between The Heads and Cape Blanco, is composed of a group of irregular rocks up to 149 feet high and ledges, many of which are awash or show a break. Kelp extends from Orford Reef to within 1.3 miles of the shore. A lighted whistle buoy, 6.5 miles SW of Cape Blanco, is the guide for clearing this reef.

Fox Rock and **Southeast Black Rock,** 1.3 miles apart, about 5 miles SW of Cape Blanco, are the southernmost rocks of Orford Reef; they usually show a heavy break. **Northwest Rock,** 3 miles SW of Cape Blanco, is the northernmost visible rock of

Orford Reef, although several rocks, covered 5 fathoms, are 1.2 miles NE of Northwest Rock.

Blanco Reef, extending 1.5 miles SW from Cape Blanco, consists of numerous rocks and ledges, some of which are marked by kelp. **Black Rock,** 1.2 miles SW of Cape Blanco Light, is the southernmost visible rock of Blanco Reef. **Pyramid Rock,** 1 mile W of the light, is the northernmost visible rock of the reef, although a rocky patch uncovers about 3 feet 0.4 mile to the N. Rocky patches, covered ½ to 6 fathoms, extend from 0.5 mile SW of Black Rock to 0.4 mile W of Pyramid Rock.

In clear weather small vessels with local knowledge sometimes use the passage inside Orford Reef and between Orford Reef and Blanco Reef.

Cape Blanco projects about 1.5 miles from the general trend of the coast. It is a small bare tableland, terminating seaward in a cliff 203 feet high, with low land behind it. A large high rock lies close under the S side of the cape. From seaward the cape is not prominent, but, from N or S, it appears like a moderately low bluff islet. The group of buildings at Cape Blanco is very prominent.

Cape Blanco Light (42°50.2'N., 124°33.8'W.), 245 feet above the water, is shown from a 59-foot white conical tower near the center of the flat part of the cape; a radiobeacon is close N of the light. The tank and lookout tower at The Heads should not be mistaken for the light tower.

Numerous covered and visible rocks extend 0.5 mile or more NW from the cape.

Gull Rock, 1 mile N of Cape Blanco Light, is surrounded by covered rocks. Its seaward face is black and rugged, and the summit has two knobs, the higher being to the S. A rocky patch, covered 3 fathoms, lies 0.5 mile W of Gull Rock.

Castle Rock, 1.5 miles NE of Cape Blanco Light and 300 yards off the mouth of **Sixes River,** rises abruptly from the sea and is readily made out 10 miles to seaward. Many low rocks and ledges are within 400 yards, and several rocky islets are to the W and NW.

Blacklock Point is a precipitous rocky point 2.5 miles NNE of Cape Blanco. The cliff is 157 feet high. A sharp high point, bordered by rocks, stretches out nearly 300 yards. A narrow curved line of rocks extends 0.8 mile WSW from the point. A rock that breaks in heavy weather is 1 mile NW of the point. Rocky patches, covered 4 fathoms, are within 1.3 miles of the point in a W and NW direction.

Chart 18580.–From Cape Blanco for 112 miles to Yaquina Head, the coast is remarkably straight and trends in a NNE direction. It differs considerably from the coast to the S. The coastal mountains are much lower, the difference being more marked because of the high mountains inland. The shore consists of high yellow sand dunes and cliffs broken by bold rocky headlands of moderate height and backed by low pine-covered hills. There are few outlying dangers, the outermost being Blacklock Point, Coquille Rock, and Cape Arago.

From Blacklock Point the shore continues rocky with cliffs gradually decreasing in height for 1.5 miles N, thence for about 11 miles the shore is a broad sandy beach backed by dunes and long narrow lakes. The tree line is at an average distance of 0.2 mile from the sea. From the end of the sand beach for 2 miles to the mouth of Coquille River, the shore again consists of rocky cliffs, 40 to 80 feet high, with several outlying rocks as much as 0.5 mile from shore. Covered dangers extend 1.6 miles W from Coquille Point. The land directly behind this stretch of coast is comparatively flat and wooded, rising to heights of 1,000 feet in 2.5 to 3 miles.

Charts 18588, 18580.–Coquille River, 18 miles N of Cape Blanco, is used for barging of lumber from two large lumbermills on the river. The larger mill is at the town of **Bandon,** 0.8 mile above the entrance, and the smaller mill is just above the highway lift bridge about 3 miles above the entrance. Some fishing boats operate from Bandon; a small fishery is near the city pier.

Coquille Point is 0.6 mile S of Coquille River entrance. Several rocky islets extend 0.5 mile off the point and rocks showing breakers in any swell extend 1.2 miles W and a mile NW of the point.

Coquille Rock, 1.6 miles NW of the point, is covered 28 feet and breaks in heavy weather.

A long, low area of shifting dunes is N of the Coquille River entrance. The conical tower and dwelling of an abandoned lighthouse is near the inner end of the N jetty.

COLREGS Demarcation Lines.–The lines established for the Coquille River are described in 80.1315, chapter 2.

The entrance to Coquille River is protected by jetties; a seasonal light and fog signal are on the S jetty. A marked dredged channel leads from the entrance to the lower lumbermill at Bandon. In September 1981, the controlling depths were 9 feet to the port district wharf, thence in 1980-May 1981, 11 feet (13 feet at midchannel) to the lumbermill wharf. The channel is subject to frequent change, and the deepest water is not always on the entrance range. Local knowledge is essential when the bar is rough. The reported depth above Bandon is about 6 feet to Coquille, 21 miles above the entrance.

The Coast Guard patrol station at Bandon is on a bluff on the S side of the channel about 0.6 mile inside the entrance. A boat patrol is maintained by the Coast Guard from May 15 to October 15.

Storm warning signals are displayed. (See chart.)

The Coast Guard has established a seasonal **rough bar advisory sign,** 15 feet above the water, visible from the channel looking seaward, on a wharf on the S shore just N of the Coast Guard station, to promote safety for small-boat operators. The sign is diamond-shaped, painted with an international orange border, and with the words **"Rough Bar"** in black letters. The sign is equipped with two quick flashing amber lights that will be activated when the seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

The 390-foot port district wharf, on the S side of the channel 0.7 mile above the entrance, has been condemned for commercial use. The city pier, 175 yards E of the port wharf, has reported depths of 16 feet at the face; gasoline, diesel fuel, and water are piped to the pier. The 310-foot wharf of the lumbermill about 450 yards NE of the city pier, has reported depths of 12 feet alongside and a deck height of 24 feet. A small-craft basin is between the city pier and the port district wharf. About 180 berths, gasoline, diesel fuel, a launching ramp, and marine supplies are available. A machine shop is at Bandon.

A highway bridge, 3 miles above the entrance, has a lift span with clearances of 28 feet down and 74 feet up. (See 117.1b and 117.759b(a) through (d), and (f)(11), chapter 2, for drawbridge regulations and opening signals.) An overhead cable E of the bridge has a clearance of 72 feet.

(See 207.660, chapter 2, for special regulations for logging operations on the North Fork of Coquille River.)

Prosper, 4 miles above Coquille River entrance, has a small-craft basin; berths are available in reported depths of 12 to 15 feet.

Several power cables cross the river between Prosper and Coquille; the least clearance is 68 feet.

Coquille, 21 miles above the entrance, is the distributing center for several agricultural communities of the river valley, and has railway connections with the interior.

Chart 18580.–N of the entrance to the Coquille River the sand dunes extend for about 4 miles and are then succeeded by cliffs. **Fivemile Point,** 6 miles N of the river entrance, is a rocky cliff 60 feet high with a cluster of rocks, 10 to 40 feet high, extending more than 0.3 mile offshore.

N of Fivemile Point the coast consists of cliffs, 40 to 80 feet high, which rise to heights of 100 to 250 feet 2 miles S of Cape Arago and are cut by deep gulches, named the **Seven Devils.** Numerous rocks of varying shapes and sizes border the beach.

South Cove, immediately under the S point of Cape Arago, is used extensively as a summer anchorage by small craft and fishing boats with local knowledge.

Cape Arago, 29 miles NNE of Cape Blanco, is an irregular jagged point projecting about a mile from the general trend of the coast. There are no high mountains immediately behind the cape, and it is conspicuous only when the mountains in the interior are obscured. The seaward face of the cape, 2.5 miles long in a N direction, is a narrow sparsely wooded tableland 50 feet high, with rugged and broken cliffs and outlying rocks of the same height as the cliff. Immediately off the cape are reefs extending NW for about a mile. A small cove near the N end, inside the reefs, is sometimes used by small boats with local knowledge.

Charts 18587, 18580.–Cape Arago Light (43°20.5'N., 124°22.5'W.), 100 feet above the water, is shown from a 44-foot white octagonal tower attached to a building on a rocky, partially wooded island close inshore, 2.5 miles N of the cape. A radiobeacon and fog signal are at the station.

Baltimore Rock, 0.6 mile NW of Cape Arago Light, is covered 11 feet and usually breaks. It is the outermost rock of a covered ledge extending NW from the lighthouse island. A bell buoy is 450 yards N of the rock.

Coos Head, 229 feet high, 1.8 miles ENE of Cape Arago Light, is on the S side of the entrance to Coos Bay. The cliffs are about 100 feet high and terminate in several small rocky points with sand beaches between them. The buildings of the U.S. Naval facility for oceanographic research are conspicuous on the bluffs just SW of Coos Head.

Storm warning signals are displayed. (See chart.)

Coos Bay, 33 miles N of Cape Blanco, is used as a harbor of refuge and can be entered at any time except in extreme weather. Coos Bay is one of the most important harbors between San Francisco and the Columbia River, and one of the largest forest products ports in the world. Principal foreign exports are logs, woodchips, lumber, plywood, paper, and paperboard. The coastwise trade consists mainly of sand and gravel, lumber, plywood and veneer, gasoline, and distillate fuel oil.

From the entrance the bay extends NE for 8 miles with widths of 0.3 to 1 mile, then bends SE for about 4 miles to the mouth of Isthmus Slough. The dredged channel through the bay is bordered by marshland and intersected by several sloughs.

Prominent features.–Coos Head, Umpqua River Light, and Cape Arago Light are good guides to the entrance. The sand dunes N toward Umpqua River are prominent. The entrance to the bay is protected by jetties. A light with a seasonal fog signal marks the N jetty. A lighted whistle buoy is 1.8 miles WNW of the entrance. The channels are marked with lighted ranges, lights, buoys, and daybeacons.

Routes.–Vessels should make sure of the entrance range before standing close in. There is usually a current sweeping either N or S just off the jetties, and this current should be guarded against. The entrance ranges should be watched carefully until clear of all dangers. The S current is often encountered during the summer. With strong S winds during the winter, the current sometimes sets to the N.

Approaching from any direction in thick weather, great caution is essential. The currents are variable and uncertain. Velocities of 3 to 3.5 knots have been observed offshore between Blunts Reef and Swiftsure Bank, and greater velocities have been reported. The most favorable time for crossing the bar is on the last of the flood current, and occasionally it is passable only at this time.

COLREGS Demarcation Lines.–The lines established for Coos Bay are described in 82.1320, chapter 2.

Channels.–A Federal project provides for a 45-to

35-foot channel across the bar, thence 35 feet through North Bend and Coos Bay to the mouth of Isthmus Slough, thence 35 feet to a point 1.1 miles above the mouth of Isthmus Slough, and thence, 22 feet to Millington, 14.7 miles above the entrance to the bay. Turning basins at North Bend and Coos Bay have project depths of 35 feet. (See Notice to Mariners and latest editions of charts for controlling depths.)

Caution.–The Coos Bay channel has been realined; mariners are advised to use caution because the ranges still mark the former channel alinements in the North Bend Upper reach and Ferndale Lower reach.

The Coast Guard has established a **rough bar advisory sign,** 12 feet above the water, on the E end of the breakwater at Charleston Boat Basin, 0.7 mile SE of Coos Head in about 43°20'51"N., 124°19'12"W., to promote safety for small-boat operators. The sign is two-faced and is visible from Coos Bay to the N and South Slough to the S. The sign is diamond-shaped, painted white with an international orange border, and with the words **"Rough Bar"** in black letters. The sign is equipped with two flashing amber lights that will be activated when the seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are advised, however, that if the lights are not flashing, it is no guarantee that the sea conditions are favorable.

Anchorage.–Anchorage for deep-draft vessels with good holding ground, sand bottom, can be had about 1 mile NE of Coos Bay Lighted Whistle Buoy K (43°22.2'N., 124°23.0'W.). Anchorage for small craft can be had almost anywhere in the bay outside the dredged channels and below the railroad bridge.

Dangers.–Guano Rock, on the S side of the entrance channel and 280 yards NW of Coos Head, uncovers only at extreme low water.

A submerged section of the N entrance jetty extends about 300 yards W of the visible jetty; and a submerged section of the S entrance jetty extends about 100 yards W of the visible jetty. Because of the submerged jetties, it is reported that there are breakers in these areas most of the time. Extreme care must be exercised at all times.

A submerged jetty extends 500 yards off the E shore of Coos Bay just inside the entrance, 0.8 mile NE of Coos Head. In entering with a strong NW wind, large vessels have difficulty in making the turn and may find themselves being set toward the submerged jetty.

Bridges.–A railroad bridge across Coos Bay, 7.5 miles above the entrance, has a swing span with a clearance of 12 feet. A fixed highway bridge, 8.1 miles above the entrance, has a clearance of 123 feet across the main channel. A power cable, 100 yards W of the fixed bridge, has a clearance of 167 feet. (See 117.720 (b), chapter 2, for drawbridge regulations.)

Tides.–The mean range of tide at Coos Bay is 5.6 feet, and the diurnal range of tide is 7.3 feet. A range of about 12 feet may occur at the time of maximum tides.

Currents.–Current observations in the entrance to Coos Bay indicated a velocity of about 2 knots. The greatest observed ebb velocity was a little over 3 knots. Predictions for the entrance may be obtained from the Tidal Current Tables. During long runouts an ebb current of 5 knots has been reported at Guano Rock.

Storm warning signals are displayed. (See chart.)

Pilotage.–Pilotage is compulsory for all foreign vessels and U.S. vessels under register. Pilotage is optional for U.S. vessels in the coastwise trade that have onboard a pilot licensed by the Federal Government for these waters. Pilots usually board vessels about 1 mile seaward of Coos Bay Approach Lighted Whistle Buoy K. The pilot boats, COOS BAY and NORTH BEND, are 75-foot tugs with black hulls, international orange pilot houses, and white stacks with the letters CTB. The pilot monitors VHF-FM channels 16 (156.80 MHz) and 18 (156.90 MHz). Vessels are handled 24 hours a day, weather permitting. The pilot boats fly the International Code Flag "P" by day and display the standard pilot lights at night. Arrangements for pilots are usually made through ships' agents. A 4-hour notice of time of arrival is requested.

Towage.–Tugs to 1,200 hp are available and are used for docking and mooring. The two pilot boats, the largest tugs available, do most of the dock assist work in the port.

Coos Bay is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1, for details.)

Coast Guard.–A Coast Guard station is on the S side of Charleston Boat Basin, 0.7 mile SE of Coos Head.

Harbor regulations.–The Port of Coos Bay is controlled by a Board of Port Commissioners and a port manager. Harbor regulations are prescribed by the Port Commissioners and enforced by the port manager. The port manager's office is in Room 208, Gebhardt Building, Second and Commercial Streets, Coos Bay.

Wharves.–The Port of Coos Bay, including facilities at the cities of Coos Bay and North Bend, has more than 10 deep-draft piers and wharves with about 15 deep-draft berths. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 33, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported depths; for information on the latest depths contact the port manager or the private operators. All the facilities described have direct highway connections, and most have plant trackage with direct railroad connections. Water is available at most of the wharves, but electrical shore power connections are available at less than half of the wharves. Special handling equipment, if available, is mentioned in the description of the particular facility.

Roseburg Lumber Co. Chip Dock (43°25'31"N., 124°15'23"W.): 260-foot marginal wharf with 1,030-foot berthing space with dolphins, 32 feet alongside, deck height, 17 feet; wood chips loaded by pneumatic loader; shipment of chips; owned and operated by Roseburg Lumber Co.

Ocean Terminals Dock (43°24'37"N., 124°13'07"W.): 400-foot marginal wharf, 900-foot berthing space with dolphins, 33 feet alongside; 4 acres open storage; shipment of wood products; owned and operated by Ocean Terminals Co.

Weyerhaeuser Co. Wharf (43°24'05"N., 124°13'02"W.): 2,123-foot berthing space including 683-foot chip export berth at N end of wharf, 30 feet alongside, deck height, 14 feet; pneumatic chip loader, loading rate 600 tons per hour; shipment of wood chips, lumber, linerboard, plywood, and other wood products; owned and operated by Weyerhaeuser Co.

Fibrex Wharf (43°23'30"N., 124°13'02"W.): 900-foot berthing space with dolphins, 36 feet alongside; pneumatic chip loader, loading rate 650 tons per hour; shipment of wood chips; owned by Ocean Terminals Inc., operated by Fibrex and Shipping Co., and Kanematsu Gosho USA, Inc.

Bayshore Dock (43°23'13"N., 124°13'07"W.): 506-foot berthing space, 30 feet alongside, deck height, 12 feet; 3 acres open lumber storage area; shipment of finished lumber products; owned and operated by Al Pierce Lumber Co.

Standard Oil Co. Wharf (43°23'10"N., 124°13'02"W.): 190-foot berthing space, 32 feet alongside, deck height, 20 feet; receipt of petroleum products, fueling tugs and small craft; owned and operated by Standard Oil Co. of Calif.

Union Oil Co. Marine Dock (43°23'06"N., 124°13'08"W.): 260-foot berthing space with dolphins, 31 feet alongside, deck height, 15½ feet; receipt of petroleum products, fueling tugs and small craft, bunkering deep-draft vessels; owned and operated by Union Oil Co. of Calif.

Dolphin Terminals Wharf (43°23'02"N., 124°13'00"W.): 500-foot berthing space with dolphins; 25 feet alongside; deck height, 10 feet; shipment of logs; owned and operated by Dolphin Terminals, Inc.

Central Dock Co. Wharf (43°22'38"N., 124°12'45"W.): 1,550-foot berthing space with dolphins, 35 feet alongside, deck height, 12 feet; 4 acres open storage; pneumatic chip loader, loading rate 350 tons per hour; shipment of wood chips, wood products, and scrap metal, receipt and shipment of general cargo; owned by Central Dock Co., and operated by U.S. Plywood.

Portland Dock (43°21'40"N., 124°12'14"W.): 576-foot berthing space; 33 feet alongside; deck height, 14 feet; about 15 acres open storage in rear; receipt of bulk urea, shipment of logs; owned and operated by Al Pierce Lumber Co.

Georgia-Pacific Corp. Wood Chip Dock (43°21'43"N., 124°12'02"W.): 1,326-foot berthing space, 30 feet alongside, deck height, 12 feet; W berth used for loading ships by pneumatic loader, loading rate, 420 tons per hour; 20 acres open lumber storage area; receipt of caustic soda; shipment of finished lumber, plywood, and wood chips; owned by Georgia-Pacific Corp., operated by Georgia-Pacific Corp. and Coos Head Timber Co.

Supplies.–Most marine supplies and services are available at Coos Bay. Fuel oil is available at two fuel piers; however, most bunkering is done at the vessel's berth by tanker truck. Diesel oil and water are available.

Repairs.–There are no facilities for major repairs to large oceangoing vessels in Coos Bay; the nearest such facilities are in Portland, Oreg. Above-the-waterline repairs can be made at several machine shops on the waterfront. The largest marine railway in Coos Bay, at the mouth of Isthmus Slough, can handle vessels to 400 tons, 120 feet long, 32 feet wide, and 12 feet in draft. Hull and engine repairs can be made here. Electronic repairs can be arranged for. (See Charleston Boat Basin, this chapter, for small-craft facilities and repairs.)

Communications.–The cities of Coos Bay and North Bend are served by U.S. Highway 101 and the Southern Pacific Railroad. Two state highways connect to Interstate Highway 5 inland. North Bend Municipal Airport, served by a major airline, is just NW of North Bend.

South Slough, shoal and navigable only for small boats, extends 4 miles S from its junction with Coos Bay near the entrance. A marked channel extends S from the junction for about 0.6 mile to the Charleston Boat Basin, and thence for 0.5 mile to a highway swing bridge. In September 1981, the controlling depths were 10 feet to the basin, with shoaling to 4 feet along the W edge, thence 8 feet to the highway swing bridge. The channel, from the junction with Coos Bay to Charleston Boat Basin, is subject to shoaling. Mariners are advised to seek local knowledge when transiting this area.

Charleston Boat Basin, operated and maintained by the Port of Coos Bay, is 0.3 mile N of Charleston, across the slough from **Barview.** In September 1978, depths of 8 to 10 feet were available in the basin. The basin is used by commercial and sport fishermen. About 500 berths with electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available. A repair facility at the basin has marine railways, the largest of which can handle craft 70 feet long, 22 feet wide, and 6 feet draft for hull and engine repairs. Electronic repairs can also be made at the basin. Four fish piers are in the basin, and three fish packing facilities are just S of the basin on South Slough. A Coast Guard station is on the S side of the basin.

A Coast Guard buoy storage area, marked by a buoy, has been established in Coos Bay about 150 yards E of the channel and about 2.5 miles above the entrance jetties.

The highway bridge over South Slough, 1 mile S of the entrance, has a swing span with a clearance of 10 feet. (See 117.1b, chapter 2, for drawbridge opening signals.) Power and television cables S of the bridge have a least clearance of 71 feet.

The W shore of Coos Bay as far as the bend is formed by a sandspit covered with dunes, partly wooded, and in some places as much as 90 feet high. On the E shore and above the bend are low rolling hills with houses and several prominent buildings.

Haynes Inlet and **North Slough,** which join the bay through a common entrance on the N side, are navigated by small boats. A causeway with a fixed bridge over North Slough, has a clearance of 18 feet. The causeway extends E and joins the State highway fixed bridge over Haynes Inlet. The State highway fixed bridge over Haynes Inlet has a clearance of 32 feet. The power cable over the common entrance of the two streams has a clearance of 67 feet.

North Bend, 9.5 miles above the entrance, is a city with many sawmills and factories; considerable lumber is shipped from here. **Coos Bay,** 12 miles above the entrance, is the principal city on the bay and is the distributing center for the area, which is primarily devoted to lumbering, fishing, and agriculture. Coos Bay also includes the **Empire** district, which is 4 miles above the entrance. North Bend and Coos Bay form practically one continuous city extending along the shore from North Point to the mouth of Coalbank Slough.

Three sloughs empty into Coos Bay between the city of Coos Bay and Coos River. **Coalbank Slough** is unused. **Isthmus Slough** is used for logging operations to **Millington.** The highway bridge across the slough has a bascule span with a clearance of 18 feet. (See 117.1b and 117.759b(a) through (d), and (f)(12), chapter 2, for drawbridge regulations and opening signals.) The overhead power and television cables just N of the bridge, and the overhead power cable 0.9 mile S of the bridge, have clearances of 100 and 150 feet, respectively. **Catching Slough** is navigable for several miles by light-draft vessels. The highway bridge across the mouth has a swing span with a clearance of 11 feet. The power cables for about 1.7 miles above the bridge have a least clearance of 57 feet; other overhead cables upstream have a least known clearance of 13 feet.

Coos River empties through two channels into the bay at its head. The N unmarked channel follows the E side of the bay and empties abreast of North Bend. **Marshfield Channel,** marked by a lighted range and lights, crosses the flats and empties abreast the city of Coos Bay.

Coos River divides at a point 3.2 miles above **Graveyard Point** into **South Fork** and **Millicoma River.**A highway bridge across the river, 0.9 mile above Graveyard Point, has a lift span with clearances of 28 feet down and 54 feet up. The least clearance of the overhead power cables crossing Millicoma River is 40 feet. **Allegany,** 7.5 miles above the confluence, is the head of navigation on Millicoma River. **Dellwood,** 8.2 miles above the confluence, is the head of navigation on South Fork.

In 1980, the controlling depth in Coos River was 4 feet with local knowledge through Marshfield Channel to the lift bridge about 0.9 mile above Graveyard Point; thence in 1977–1980, a controlling depth of 4 feet was available to the junction of Millicoma River and South Fork. In 1980, the controlling depth in South Fork was 1 foot to Dellwood. In 1979, the controlling depth in Millicoma River was 1 foot to Allegany. Numerous snags exist in the South Fork and the Millicoma River.

A fixed highway bridge crossing South Fork 0.5 mile above the confluence has been removed; two concrete piers remain. A fixed highway bridge crossing South Fork 1.9 miles above the confluence has a clearance of 38 feet. Several overhead power and telegraph cables cross South Fork; least clearance is 42 feet. (See 207.663, chapter 2, for special regulations for logging in the tidal section of South Fork.)

Chart 18580.–From Coos Bay for 19.5 miles to Umpqua River, the coast consists of sand beaches and dunes backed by moderately low hills. The mouth of **Tenmile Creek** is 13.7 miles N of Coos Head.

Charts 18584, 18580.–Umpqua River is entered 20 miles N of Cape Arago Light. Some lumber, sand, crushed rock, and oil are barged on the river, but commercial traffic is very light. The **customs port of entry** is at Coos Bay.

The S point at the entrance to the river is marked by sand dunes, partly covered with trees, that reach elevations of 300 feet. About a mile below the entrance is a bright bare spot in the dunes that shows prominently among the trees. Shifting sand dunes about 100 feet high are on the spit on the N side of the entrance.

Umpqua River Light (43°39.8′N., 124°11.9′W.), 165 feet above the water, is shown from a 65-foot white conical tower just S of the mouth of the river; a radiobeacon is at the light. Trees surround the light, but the lantern shows over the tops.

The entrance to the river is protected by jetties. The S jetty extends 1,200 yards seaward from the shoreline and is marked by a light. A seasonal fog signal is at the light. About 160 yards of the outer end of the jetty is submerged; a lighted seasonal gong buoy is about 300 yards off the outer end. A lighted whistle buoy is about 0.9 mile W of the S Jetty Light. The middle jetty extends from the shoreline and connects with the outer section of the S jetty. The N jetty extends 1,100 yards seaward from the shoreline. In March 1981, it was reported that dangerous shoals exist in the N side of the entrance. The river channels are marked by lighted ranges, lights, buoys, and daybeacons.

COLREGS Demarcation Lines.–The lines established for the Umpqua River are described in 80.1325, chapter 2.

Channels.–A Federal project provides for depths of 26 feet in the entrance channel, thence 22 feet to Gardiner and Reedsport, and 22 feet in the turning basin at Reedsport.

The channel over the bar is reported shoalest usually during September. Later in the season the river cuts a deeper channel through the bar. Depths in the channels and basins may vary considerably between dredging operations. (See Notice to Mariners and latest editions of charts for controlling depths.)

The Coast Guard has established a **rough bar advisory sign,** visible from the river channel looking seaward, on Winchester Point about 1.5 miles inside the river entrance, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, and with the words **"Rough Bar"** in black letters. The sign is equipped with two flashing yellow lights that will be activated when the seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are advised, however, that if the lights are not flashing, it is no guarantee that conditions are favorable.

Storm warning signals are displayed. (See chart.)

Supplies.–Gasoline, diesel fuel, water, and fuel oil for launches may be obtained at Reedsport.

Repairs.–A machine shop is at Reedsport; a hoist here can handle craft to 100 tons, however, the hoist is currently used only for emergency haulouts. A tidal graving dock for barges, 260 feet long and 60 feet wide, is operated by this firm across the river. Hull and engine repairs for small craft can be made at Salmon Harbor.

Salmon Harbor, a small-boat harbor on the E side of Umpqua River, 1.5 miles above the entrance, is entered through a dredged channel that leads from the main river channel to a turning basin in the harbor, about 0.4 mile above the entrance. The channel is marked at the entrance by two lights. A seasonal fog signal is at the W entrance light. In April 1979, the channel had a controlling depth of 6 feet to the turning basin, thence 9 feet in the basin. Depths of 4 to 7 feet are available elsewhere in the harbor. Berths with electricity, gasoline, diesel fuel, water, ice, launching ramps, marine supplies, and an 8-ton crane are available in the harbor; hull, engine, and electronic repairs can be made. A fish wharf with a cold storage and ice plant on its outer end is on the W side of the harbor.

Winchester Bay, entered from the N immediately W of Salmon Harbor, is a partially enclosed basin that was constructed as an expansion of Salmon Harbor. In April 1979, the controlling depth was 7 feet in the entrance channel to the basin, thence depths of 5 to 10 feet in the basin. The village of **Winchester Bay** is a fishing resort on the E side of Salmon Harbor and Winchester Bay.

Gardiner, on the NE bank of the river 8.5 miles inside the entrance, is the site of a large papermill and a lumbermill. A dredged channel serves these mills. Barges unload fuel oil at the papermill wharf, 0.8 mile N of the town. Depths of 18 feet are reported alongside. The wharf is marked by a private light. There is a public small-craft launching ramp in Gardiner.

Reedsport, on the SW bank of the river, 10 miles inside the entrance, is a station on the railroad and the principal town on the river. A plywood plant and a sawmill are in the town. The plywood plant wharf, at the entrance to Scholfield Creek, is in ruins and not used. The sawmill barges lumber intermittently from the port wharf, which is between the swing bridges; the wharf has about 18 feet along the loading face. A lumber wharf, used occasionally, is on the NW end of Bolon Island.

The highway bridge, crossing the river at the lower end of the turning basin at Reedsport, has a swing span with a clearance of 36 feet. (See 117.1b and 117.759b(a) through (d) and (f)(16), chapter 2, for drawbridge regulations and opening signals.) Just W of the bridge is a power cable with a clearance of 152 feet; the least clearance of cables above the highway bridge is 95 feet. The railroad bridge, 500 yards above the highway bridge, has a swing span with a clearance of 16 feet. (See 117.725, chapter 2, for drawbridge regulations.)

At high tide Umpqua River is navigable by vessels of 6-foot draft to **Scottsburg,** 14.8 miles above Reedsport.

Scholfield Creek enters Umpqua River N of Reedsport. The entrance to the creek is marked by daybeacons. A fixed highway bridge with a clearance of 20 feet crosses the creek 0.9 mile above the mouth; power cables with a least clearance of 41 feet crosses the creek between the two bridges. A fixed railroad bridge with a 30-foot span clearance of 16 feet crosses the creek 2 miles above the mouth.

Smith River enters Umpqua River from the NE at Reedsport. The controlling depth is about 5 feet for 5 miles above the mouth, thence 2 feet to **Sulphur Springs Landing,** 18 miles above the mouth. The highway bridge, 2.7 miles above the mouth, has a retractable span with a clearance of 22 feet. An overhead telephone cable with a clearance of 67 feet crosses the river just below the bridge.

Chart 18580.–From Umpqua River for 21 miles to Siuslaw River, the coast is straight and consists of sand dunes broken only by the mouths of **Threemile Creek, Tahkenitch Creek, Siltcoos River,** and the stream from **Cleawox Lake.**

Charts 18583, 18580.–Siuslaw River, entered 43 miles N Cape Arago Light and 7.5 miles S of Heceta Head Light, has some logging operations, and finished lumber is barged to Pacific ports. Prominent from offshore is wooded **Cannery Hill,** on the E side of the river 1.4 mile above the entrance. The **customs port of entry** is at Coos Bay.

COLREGS Demarcation Lines.–The lines established for the Siuslaw River are described in 80.1330, chapter 2.

The river is entered through a dredged channel between two jetties and leads S to a turning basin off the town of Florence, 4.4 miles above the entrance, thence E for about 2 miles to Cushman. A light and seasonal fog signal, and a Coast Guard lookout station are on the N jetty. The channel is marked by a **094°** lighted entrance range that favors the N side of the channel, and by other ranges and navigational aids to 1 mile above Florence.

The uncharted buoys at the mouth of the river are frequently shifted to mark the best water. The bar at the entrance is narrow, and the depths vary greatly because of storms and freshets. In September 1980, a depth of 4 feet was on the range over the bar. Mariners are advised to contact Coast Guard Station Siuslaw River on VHF-FM channel 16 (156.80 MHz) before attempting to cross the bar. In February-July 1981, the controlling depth was 7 feet at midchannel from the E end of the bar channel to the turning basin at Florence, thence depths of 5 to 16 feet in the basin, except for shoaling to 1 foot in the S quarter; thence a controlling depth of 7 feet was available to Cushman. In August 1981, the midchannel controlling depth was 9 feet to about 7.4 miles above Cushman; caution is advised throughout Siuslaw River.

The Coast Guard has established a **rough bar advisory sign,** 37 feet above the water, visible from the channel looking seaward, on the Coast Guard lookout tower on the N jetty, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, and with the words **"Rough Bar"** in black letters. The sign is equipped with two flashing amber lights that are activated when the seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

A Coast Guard station is on the E side of the river, 1.6 miles above the entrance. A marina, on the E bank 0.4 mile above the Coast Guard pier, has about 125 berths with electricity, gasoline, water, ice, launching ramp, marine supplies, and two 7-ton hoists.

Storm warning signals are displayed. (See chart.)

Florence is a small town on the N bank of Siuslaw River 4.4 miles above the entrance. A bascule highway bridge with a clearance of 17 feet crosses the river from Florence to **Glenada,** a small settlement on the S bank of the river opposite Florence. (See 117.1b and 117.759b(a) through (d) and (f)(11), chapter 2, for drawbridge regulations and opening signals.) An overhead power cable with a clearance of 23 feet crosses the river about 150 yards E of the bridge; the cable is submerged at the main channel. Another overhead power cable with a clearance of 88 feet crosses the river about 1 mile above the bridge.

A cannery wharf, marina, and a small port-operated boat basin, locally known as **Holiday Harbor,** are at Florence; fish are shipped by truck. The marina, about 0.15 mile W of the highway bascule bridge, has about 80 berths, dockside electricity, gasoline, water, ice, launching ramp, marine supplies, and a 2-ton hoist; minor engine repairs can be made. **Holiday Harbor,** about 0.3 mile E of the highway bascule bridge, has over 250 berths, gasoline, diesel fuel, water, some marine supplies, and launching ramps.

Cushman, on the N bank of the river 2 miles above Florence, has lumber and shingle mills. The products from these mills are shipped by rail and barge. A small-craft repair facility here has a marine railway that can handle craft to 25 tons, 48 feet long, 14 feet wide, or 6½ feet in draft for hull repairs. A 2-ton hoist is also available for handling small craft. A large marine supply firm is at Cushman. An overhead power cable with a clearance of 75 feet crosses the river at Cushman. The railroad bridge across the river, 1 mile above Cushman, has a swing span with a clearance of 15 feet. An overhead power cable with a clearance of 80 feet crosses the river at Mapleton. (See 117.1b and 117.759b(a) through (d) and (f)(11), chapter 2, for drawbridge regulations and opening signals for bridges on the Siuslaw River.)

Light-draft vessels can go to **Mapleton,** 17 miles above the mouth, but the channel is narrow and crooked. A barge facility, about 14 miles above the mouth of the river, ships wood products and some perishible goods downriver.

Chart 18580.–From Siuslaw River for 7.5 miles to Heceta Head, the coast is composed of sand dunes that are quite conspicuous in contrast with the dark trees partly covering them.

Heceta Head, 28.5 miles N of Umpqua River Light, has a seaward face 2.5 miles long with nearly vertical cliffs 100 to 200 feet high. The summit of the head reaches an elevation of 1,000 feet 0.5 mile from the cliffs and is covered with grass and a few pines. A sharp black conical rock, 180 feet high, marks the extreme W and N part of the head, and is easily made out from either N or S. **Cox Rock,** 1.5 miles S of the S part of the head, is conical and usually white on top with bird droppings.

Heceta Head Light (44°08.3'N., 124°07.6'W.), 205 feet above the water, is shown from a 56-foot white conical tower on a bench cut in the high bluff near the W extremity. Because of the high bluff N of the light, vessels from N will not make out the tower or buildings until abreast the station.

Heceta Bank, 70 miles NNW of Cape Blanco and 30 miles offshore W of Heceta Head, covers an irregular area about 30 miles long and 10 miles wide. The least depth on the bank is 25 fathoms, but the depths are irregular. The depths N and S of the bank are considerably greater.

From Heceta Head to Cape Perpetua, a distance of 9 miles, the coast consists of high broken rocky cliffs, except for the first 2 miles which are composed of much lower sloping sandy cliffs, backed by a strip of clear land. The hills behind reach an elevation of over 800 feet in less than 0.5 mile from the beach, and are heavily wooded.

Tenmile Creek, 5 miles N of Heceta Head, is marked by a sand beach about 0.3 mile long at its mouth.

Cape Perpetua, 9 miles N of Heceta Head, consists of two projecting points, the N of which is the bolder and marked by **Cleft of the Rock Light** (44°17.5'N., 124°06.5'W.), a private light 110 feet above the water and shown from a gray square tower attached to a dwelling. The cape reaches a height of 800 feet a short distance from the beach and 1,000 feet at a distance of 0.8 mile. The rocky cliff forming the face of the N point is reddish. A few rocks that uncover are close to its face.

Yachats River, navigable only for canoes, breaks through the coast hills immediately N from Cape Perpetua.

The coast for 2.5 miles N of Cape Perpetua consists of cliffs, 15 to 30 feet high, with a narrow strip of grassy land 0.2 to 1 mile wide behind them. Thence for 5.5 miles to Alsea Bay there are low bluffs, with a broad sand beach in front and comparatively low wooded country behind them.

Table Mountain, 11 miles NE of the mouth of Alsea Bay, flat topped, covered with dead trees, and looks whitish. Another summit is 0.6 mile SW of Table Mountain.

Marys Peak, a prominent mountain 24 miles E of the entrance to Yaquina Bay, is wooded on its sides, but its summit is covered with grass.

Chart 18561.–Alsea Bay is 68 miles N of Cape Arago. The N point is low, broad, and sandy, but the S point is an abrupt sandstone cliff about 100 feet high, covered with trees. The entrance has a shifting bar with a depth of about 6 feet. With a rising tide, the bar fills in with sand and the full effect of the tide cannot be counted on. There are considerable fishing and crabbing in the bay and river, but boats rarely cross the bar. **Waldport,** a mile inside the entrance, is the principal settlement. A marina with about 100 berths, gasoline, and a launching ramp is on the NE side of the town. The river is navigable by small craft to about 10 miles above the mouth. There are several marinas along the river above Waldport; most have berths and gasoline. Outboard engine repairs can be made at a marina about 3 miles above the mouth.

The fixed bridge of the Oregon Coast Highway crossing Alsea Bay, a mile inside the entrance, has a clearance of 63 feet.

COLREGS Demarcation Lines.–The lines established for Alsea Bay are described in 80.1335, chapter 2.

The 11.5-mile coast between Alsea Bay and Yaquina Bay is nearly straight, and consists of a low sand beach backed by dunes at each end with bluffs up to 100 feet high between; the land behind is low and wooded with areas of second-growth timber. Rocks covered 2 to 4 fathoms extend almost 2 miles offshore. **Seal Rocks,** abreast the highest part of the bluffs about 5 miles N of Alsea Bay entrance, extend up to 0.5 mile offshore for 2 miles; the tallest is 20 feet high.

Stonewall Bank, 17 miles SW of Yaquina Head Light and 14 miles offshore, is 9 miles long in a N direction and 2.5 miles wide. There is a least depth of 13 fathoms on the bank. An unmarked submerged obstruction is close SW of Stonewall Bank in about 44°29.8'N., 124°24.9'W.

Yaquina Head, 32.5 miles N of Heceta Head, is distinguished by two conical hills covered with grass. The outer one is 356 feet high and the inner 390 feet high, with a low saddle between them. The extremity of the point, which projects about a mile from the general trend of the coast, is broken and rocky, but comparatively low. One mile inland from the point, the grass-covered land changes to a dense forest and the hills rise rapidly. Two covered ledges lie N of the point 0.6 mile from the beach. There is a covered rock and considerable kelp about a mile S of the point. A patch of rocks that uncovers 8 feet is about a mile N of Yaquina Head Light. S to Yaquina Bay, the coast consists of broken yellow cliffs, bordered on the S part by broad sand beaches.

Yaquina Head Light (44°40.6'N., 124°04.7'W.), 162 feet above the water, is shown from a 93-foot white conical tower on the flat bench projecting at the W extremity of the head; a radiobeacon is at the station.

Yaquina Reef and its continuation N is a ridge of hard sand and rock covered 5 to 30 feet. The reef extends from the outer end of the N jetty and parallel to the shore to Yaquina Head. The wreck of the concrete ship JOHN ASPIN uncovers 5½ feet on the reef 0.65 mile N from the outer end of the N jetty.

South Reef, covered 11 feet, is a S continuation of Yaquina Reef, the two being separated by the entrance channel.

Chart 18581.–Yaquina Bay entrance is 4 miles S of Yaquina Head Light. The bay is a tidal estuary, the harbor itself being merely the widening of **Yaquina River** just inside the entrance.

The N point of Yaquina Bay entrance is a sandy bluff, 120 feet high. An abandoned lighthouse and a Coast Guard lookout tower are on the high part of the point. When viewed from the NW, the circular lighthouse tower on the roof of a two-story frame dwelling obscures the lower portion of the lookout tower. The S entrance point is a low sand beach backed by dunes rising to 150 feet.

The entrance to Yaquina Bay is protected by jetties 330 yards apart. The long N jetty, with the outer 125 yards submerged, extends out to Yaquina Reef. A seasonal light is on the S jetty about 70 yards inside the seaward end. A fog signal is at the light. A lighted whistle buoy is 1.5 miles SW of the entrance. The channels are marked by lighted ranges, lights, and buoys. A fog signal is sounded at the entrance range front light. Two rocks awash, about 100 yards apart, are about 50 yards S of the submerged end of the N jetty.

During the summer, when the swell is approximately parallel with the coast, the bar is comparatively smooth, being partially sheltered by Yaquina Head. In winter, however, the heavy W swell makes the bar very rough. A smooth bar and a favorable tide are necessary for large vessels leaving Yaquina Bay.

The Coast Guard has established a **rough bar advisory sign,** 25 feet above the water, visible from the channel looking seaward, on the Coast Guard station, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, and with the words "**Rough Bar**" in black letters. The sign is equipped with two quick flashing amber lights that will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

COLREGS Demarcation Lines.–The lines established for Yaquina Bay are described in 80.1340, chapter 2.

Channels.–A Federal project provides for a 40-foot entrance channel, thence 30 feet from the first turn in the channel to and in the turning basin at McLean Point, thence 18 feet to Yaquina, thence 10 feet to Toledo at the head of the project. Controlling depths may be considerably less than these project depths. (See Notice to Mariners and latest editions of the charts for controlling depths.)

Strangers desiring to enter Yaquina Bay and River should employ a pilot or a man with local knowledge. At the entrance the buoys cannot be relied upon to indicate the best water, and in the river the depths are subject to frequent change.

A fixed highway bridge across the channel, about 1.3 miles above the entrance, has a clearance of 129 feet. A Coast Guard station is on the N side of the bay, 400 yards NE of the bridge.

Newport, just inside the N entrance point, is the principal town on the bay and river. The town has a considerable fishing industry with several small fish-processing plants. Lumber, logs, paper and plywood, either barged from upper river mills or delivered by truck, are shipped from the wharves at **McLean Point,** just E of Newport.

Tides.–The mean range of tide at Newport is 6.0 feet, and the diurnal range of tide is 8.0 feet.

Currents.–The current velocity is about 2.4 knots, on the flood, and 2.3 knots, on the ebb, in Yaquina Bay entrance. Near Newport docks the velocity is about 0.5 knot. Off Yaquina, and 1 mile S of Toledo, the velocities are about 1 to 1.4 knots. (See the Tidal Current Tables for predictions.)

Storm warning signals are displayed. (See chart.)

Pilotage.–Pilotage is compulsory for all foreign vessels and U.S. vessels under register. Pilotage is optional for U.S. vessels in the coastwise trade that have onboard a pilot licensed by the Federal Government for these waters. Pilots usually board vessels about 0.5 mile W of Yaquina Bay Approach Lighted Whistle Buoy Y (44°35.9'N., 124°06.7'W.). The pilot boat is a 50-foot tug with a black hull and a yellow and white cabin. The pilot boat uses 2638 kHz and 2738 kHz as working frequencies. Arrangements for pilot services are usually made through the ships' agents; however, the pilot can be also contacted through the Newport Coast Guard Station on 2182 kHz. Pilot service is available 24 hours a day. A 12-hour notice of time of arrival is requested.

Towage.–Tugs are available from Toledo.

Newport is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Wharves.–There are two deep-draft wharves in Yaquina Bay. The wharf at McLean Point, about 1 mile E of the highway bridge has two berths. Berth 1, just NE of the turning basin, has 535 feet of berthing space, 27 feet reported alongside, and a deck height of 24 feet. Berth 2, just N of the turning basin, has 435 feet of berthing space, 35 feet reported alongside, and a deck height of 16 feet. Logs, lumber, plywood, and paper are shipped from both berths. The wharf is owned and operated by Newport Terminals, Inc.

The wharf off the point about 0.3 mile SE of McLean Point has 750 feet of berthing space, 30 feet reported alongside, and a deck height of 14 feet. Liquified natural gas is received at this wharf. The wharf is owned by Northwest Natural Gas Company.

Small-craft facilities.–A small-boat basin is on the S side of the bay about 350 yards E of the bridge. The basin is protected to the N and W by jetties marked on the outer ends by a daybeacon and a light, respectively. A dredged entrance channel leads through the jetties, thence S along the W jetty turning E at the foot and terminating at a boat ramp at the head of the small-boat basin. In July 1981, the midchannel controlling depth in the entrance channel was 8 feet, except for shoaling to 2 feet at the boat ramp. The Port of Yaquina Bay operates a small-craft marina 0.7 mile above the highway bridge on the N shore. The moorage area, protected from the main channel by a breakwater, has berths with electricity for about 620 craft. Gasoline, diesel fuel, water, ice, and a launching ramp are available. Marine supplies can be obtained in Newport. There are several marine repair facilities on the river above Newport; the largest, a marine railway at **Weiser Point,** 0.3 miles S of Yaquina, can handle craft to 50 tons, 50 feet long, or 14 feet wide for hull repairs. A large marina, just N of **Oneatta Point,** 3.8 miles above the highway bridge at the entrance to the bay, has about 120 berths with electricity, gasoline, water, ice, and marine supplies. A hoist here can handle craft to 19 tons or 34 feet for hull and engine repairs.

Communication is by highway and air. The municipal airport is about 4 miles S of Newport. A U.S. highway extends N and S along the coast, and a State highway leads to the interior.

In 1976-April 1981, midchannel depths of 6 feet could be carried up the Yaquina River to Toledo. The channel is marked with aids to navigation to Toledo.

Yaquina is a small settlement 4.2 miles above the entrance. A power cable across Yaquina River, 0.5 mile above Yaquina, has a clearance of 77 feet. Several small marinas are along the river between Newport and Toledo. (See Newport small-craft facilities description.) **Toledo,** about 11.5 miles above the entrance has large lumbermills and a papermill. The least depths alongside the wharves are 10 feet. The fixed highway bridge, 0.5 mile above Toledo, has a clearance of 34 feet. An overhead pipeline with a clearance of 54 feet crosses Depot Slough just above the mouth. An overhead pipeline and cables with clearances of 60 feet cross **Depot Slough,** at Toledo, about 0.1 mile above the mouth. Overhead pipelines 0.3 mile above the mouth of the slough have a clearance of 18 feet.

Chart 18520.–From Yaquina Head to the mouth of Columbia River, the coast is fairly straight. The headlands are Cape Foulweather, Cascade Head, Cape Lookout, Cape Meares, Cape Falcon, and Tillamook Head. The 30-fathom curve follows the general trend of the coast about 3.5 miles offshore, without indicating the several headlands. When about opposite Tillamook Head, the curve swings W and is about 7.5 miles off the end of Clatsop Spit.

Chart 18561.–From Yaquina Head for 5.5 miles to Cape Foulweather, the coast consists of yellow and white sandstone cliffs, low and broken. **Iron Mountain,** 1.5 miles NE of Yaquina Head Light, is a 654-foot-high hill. When viewed from the S, the highest third of the hill is bare and composed of a red rock formation, the N side and lower part of the hill are covered with thick brush.

A low flat rock, 8 feet high, is 0.4 mile offshore 2.8 miles N of Yaquina Head.

Otter Rock, 11 feet high, is 3.2 miles N of Yaquina Head and 0.6 mile offshore. **Gull Rock,** 56 feet high, is 1.2 miles N of Otter Rock and 0.4 mile offshore. In line between the two rocks is a kelp field with several rocks, covered and awash. Covered rocks that break are 0.5 to 1 mile N of Gull Rock.

Cape Foulweather is a prominent headland with about 6 miles of seaward face consisting of rocky cliffs over 60 feet high. The cape is formed by several grass-covered headlands, separated by densely wooded gulches. Near the middle of the cape is a strip of flat land, 0.5 mile long and 0.2 mile wide, bare of trees. The highest point of the cape is near the S part. A grassy patch is conspicuous on the SW slope. A white building with a red roof, 0.7 mile NNE of Gull Rock, is prominent on the high bluff just S of Cape Foulweather. About 0.9 mile SE of the extreme W point of the cape is a rocky point 445 feet high, and E of the point the hills rise to 1,100 feet in 0.6 mile. Dangers extend for nearly 2 miles N of the N point of Cape Foulweather and about 600 yards offshore.

The coast highway follows the shoreline closely at Cape Foulweather.

Depoe Bay, 8 miles N of Yaquina Head, has one of the best small-boat shelters along this part of the coast. The bay proper has foul ground on both the N and S sides, but the channel leading to the narrow dredged channel to the inner basin is deep and well marked. The foul areas break in moderate seas and are marked by kelp. Prominent from seaward is the concrete arch bridge over the entrance to the basin. A lighted whistle buoy is 1.1 miles W of the entrance to the bay, and a bell buoy, seasonally lighted, is closer inshore.

COLREGS Demarcation Lines.–The lines established for Depoe Bay are described in 80.1345, chapter 2.

In 1974, the controlling depth in the dredged channel to the inner basin was 5 feet, thence in April 1979, 5 to 7½ feet in the basin.

The fixed concrete arched bridge over the entrance is unusual in that its width of 30 feet is less than the clearance of 42 feet. The **085°40′** lighted range at the S end of the bridge marks the entrance to the bay and the approach to the dredged channel to the basin; a fog signal is about 50 yards SW of the front range light. Floodlights, about 50 yards seaward of the bridge, illuminate the entrance to the inner basin. The navigator is cautioned against the dangerous surge in the narrow entrance to the basin. The entrance should not be attempted at night or in rough weather without local knowledge. A Coast Guard station is at the inner basin.

The Coast Guard has established a **rough bar advisory sign,** 25 feet above the water, visible from the channel looking seaward, on a building on the N side of the basin entrance channel, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, and with the words "Rough Bar" in black letters. The sign is equipped with two quick flashing yellow lights that will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

Storm warning signals are displayed. (See chart.)

The town of **Depoe Bay** is on the N side of the basin. The basin has a concrete bulkhead, mooring floats, and a tidal grid for minor hull repair work. Also available are gasoline, diesel fuel, water, ice, launching ramp, marine supplies, and a 3-ton hoist. Hull and engine repairs can be made.

Chart 18520.–From Cape Foulweather for 9.5 miles to the entrance of Siletz Bay, the coast continues as yellow broken bluffs, 40 to 100 feet high, bordered by about 3 miles of sandy beaches. From the N point of the bluffs to the bay entrance are sand dunes covered with low brush.

The entrance to **Siletz Bay** is 15 miles N of Yaquina Head. The entrance channel is subject to frequent change, and drafts of 4 or 5 feet are considered the deepest that can be safely taken in at high water.

The N point at the entrance is a low bluff with a narrow sand beach. The S point is a low sandspit about 250 yards wide. The dunes on the spit are thinly wooded near the shore, but become thickly wooded inland. Several houses are on the spit. The bay inside the entrance is shoal. **Siletz River** enters the bay at the SE end.

Taft and **Cutler City** are communities on the bay; both are parts of **Lincoln City,** which is 1.8 miles N. There are several marinas on the bay; a facility just above the highway bridge at the mouth of Siletz River has berths for about 65 craft, gasoline, water, ice, a launching ramp, and some marine supplies. Outboard engine repairs can be made here. The highway bridge just below the marina has a clearance of 31 feet. An L-pier is just inside the entrance to the bay on the N shore; in November 1977, it was reported that no moorage was available due to silting around the pier. A 1-ton hoist is on a pier just E of the L-pier. Marine supplies of all kinds are available for small-craft in Lincoln City.

From Siletz Bay the coast extends 7 miles N to the Salmon River. For 2.5 miles of this stretch to the outlet of **Devils Lake,** the yellow standstone cliffs are 80 to 100 feet high. The lake is a large body of freshwater, 10 feet above sea level, that empties through a narrow stream. At 0.5 mile WSW of the mouth of the stream is a covered rock that generally breaks. For 3 miles N from the outlet of the lake, the bluffs are 20 to 60 feet high, rising to grassy hills. A broad beach and ledges of rocks are along the shore.

Salmon River empties at the S extremity of Cascade Head; the entrance is nearly closed by sandbars.

Immediately S of Salmon River is a rocky cliff whose seaward face is 0.6 mile long. The summit is a dome-shaped butte 510 feet high. From here a rolling grassy plateau with a few trees extends S and E to the river. A rock, 46 feet high, is 700 yards W of this cliff, and about a mile S is a covered rock 630 yards off the beach. Immediately S of and in line with Cascade Head, opposite the mouth of the river, are three grayish rocks about 765 yards offshore. These have heights of 56 feet on the N, 25 feet in the center, and 47 feet on the S.

Cascade Head, 23 miles N of Yaquina Head, is very jagged and heavily wooded. The face of the cliff is 3 miles long, is over 700 feet high in places, and is cut by several deep gorges through which the waters of three creeks are discharged in cascades 60 to 80 feet high. Several rocks are about 0.1 mile offshore.

Two Arches, 30 feet high, is a rock 0.9 mile N of the S point of Cascade Head. The arches are visible from N; the inner is the larger.

From Cascade Head for 9.5 miles to Cape Kiwanda, the coast is a low sand beach with a narrow marsh behind the S part. Rolling hilltops, occasionally wooded, rise to an elevation of 500 feet behind the beach.

Neskowin Rock, at the high-water line about 0.3 mile N of the N extremity of the cliffs marking Cascade Head, rises abruptly from the sand beach to 113 feet in height. The rock is dark brown and wooded on top.

N of Neskowin Rock the Oregon Coast Highway is about 0.5 mile inland. At night the headlights of automobiles traveling this road cause intermittent flashes as they make the turns and might be mistaken for lights of vessels.

Nestucca River empties into **Nestucca Bay** 5.5 miles N of Cascade Head. The channel over the bar changes frequently in position and depth, and only light-draft vessels having local knowledge are able to cross. A fixed highway bridge at Pacific City has a clearance of 10 feet. The river has many snags that change the depths and shift the channel. Even in a moderate sea, the bar is extremely dangerous. The point on the S side of the entrance consists of several low-rolling, grassy hillocks, about 400 to 500 feet high, which approach very close to the beach. The N point is the S extremity of the sandspit and dunes that extend to Cape Kiwanda.

Pacific City, a summer resort 3 miles above the entrance to Nestucca Bay, has a general store. Small quantities of oil and gasoline can be had.

Haystack Rock, 327 feet high, 0.5 mile SW of Cape Kiwanda and 0.5 mile offshore, is a prominent landmark. The rock is conical and dark for about half its height, and in summer the top is whitened by bird droppings. A lighted seasonal whistle buoy is just NW of the rock.

Cape Kiwanda, 33 miles N of Yaquina Head, is a low yellow rocky point, much broken and eroded, that projects about 0.5 mile from the general trend of the coast. Behind the cape are bright sand dunes, 500 feet high, which are prominent from seaward. Just S of Cape Kiwanda is a beach resort area; a public launching ramp is here. A radiobeacon is about 0.3 mile SE of the cape.

From Cape Kiwanda the coast extends 7.5 miles in a general N direction to Cape Lookout. It is broken about halfway by the entrance to **Sand Lake,** which is shallow and not navigable. The coast consists of sand beaches and dunes until about a mile N of Sand Lake where it changes to vertical sandstone cliffs, 50 to 100 feet high. These continue to Cape Lookout.

Cape Lookout, 40 miles N of Yaquina Head, projects W for 1.5 miles, forming a narrow rocky promontory 432 feet in height at its seaward extremity. The S face is nearly straight, and its precipitous cliffs have numerous caves. The N face is sloping and covered with a thick growth of timber. The ridge that forms the cape runs at about right angles to the coast, reaching an elevation of some 2,000 feet, 3.8 miles inland. The N face of the cape is smooth and bold for the first mile, and then is much broken and marked by caves and several cascades. Fair shelter in NW winds may be had under the S side of the cape in 6 to 8 fathoms, sandy bottom. A lighted whistle buoy is about 0.5 mile off the cape.

N of Cape Lookout for 4.5 miles, the land falls to a low narrow sandy peninsula, separating Netarts Bay from the ocean. The sand dunes on the peninsula are visible for 10 or 12 miles.

Netarts Bay is a shallow lagoon most of which is bare at low water; a whistle buoy off the entrance marks the approach. The village of **Netarts** is on the N shore a mile inside the entrance. Only light-draft vessels with local knowledge can enter. A small-boat basin and launching ramp are at Netarts.

N of the entrance to Netarts Bay, for 1.5 miles to the rocks forming the S part of Cape Meares, the coast is a sandy beach, backed by cliffs 50 to 120 feet high. These cliffs, topped by sand dunes varying in height from 150 to 200 feet, are good landmarks.

COLREGS Demarcation Lines.–The lines established for Netarts Bay are described in 80.1350, chapter 2.

Chart 18558.–Cape Meares, 48 miles N of Yaquina Head, is high and rocky, with a 2-mile-long seaward face. The N part is the higher, with nearly vertical cliffs 640 feet high. The W point is narrow, covered with fern and brush, and terminates seaward in a cliff 200 feet high.

Three Arch Rocks are the largest of a cluster extending 350 yards off the S point of the cape. They range in height from 204 to 275 feet. The largest arch is in the middle of the lowest rock, and is about half the height of the rock above water. These rocks are the favorite resort of sea lions, whose barking can be heard a considerable distance with a favorable wind.

Cape Meares Light (45°29.2′N., 123°58.6′W.), 232 feet above the water, is shown from a 17-foot white masonry building on the summit of the cliff.

Pillar Rock, 75 feet high, is 0.2 mile NW of Cape Meares Light, and 0.4 mile farther NW is **Pyramid Rock,** 110 feet high, which leans seaward.

From Cape Meares to Kincheloe Point, the coast is a low partly wooded sandspit, with dunes 40 to 50 feet high. It forms the W shore of Tillamook Bay. A sand dike prevents a breakthrough N of Cape Meares, at **Pitcher Point.**

Tillamook Bay entrance is 42 miles S of the Columbia River, 22.5 miles S of Tillamook Rock Light, and 5 miles N of Cape Meares Light. The bay has a tidal area of about 13 square miles, most of which, at low tide, presents a succession of sand and mud flats. There is no commercial traffic in the bay except for fishing boats and pleasure craft.

Kincheloe Point is low and sandy and appears to be an island from a distance to the N. The N side of the entrance is the termination of a high wooded ridge extending between the bay and Nehalem River. **Green Hill,** opposite Kincheloe Point, is a 400-foot spur that terminates in a bluff rounded point. The prominent hill is covered by ferns, grass, and dense brush with trees on top.

A Coast Guard station is on the N shore W of Garibaldi. A lookout tower is near the intersection of the N entrance jetty and the beachline.

COLREGS Demarcation Lines.–The lines established for Tillamook Bay are described in 80.1355, chapter 2.

The entrance to Tillamook Bay is protected by jetties. The N jetty, extending about 800 yards offshore, is marked near the seaward end by a seasonal light and fog signal. A lighted whistle buoy is 1.1 miles W of the end of the N jetty. The channel to Garibaldi is marked by a lighted range, lights, buoys, and a daybeacon. The bar sometimes makes out across the range from the N during the summer or whenever there have been any long periods of NW winds.

In May 1981, a depth of 20 feet could be carried on the **094°31′** lighted range, thence 16 feet (18 feet at midchannel) in the dredged channel to Garibaldi; thence 8 feet in the channel to the small-craft basin at Garibaldi; thence in September 1980-May 1981, depths of 6 to 12 feet were available in the basin. Mariners are advised that the entrance channel is subject to frequent changes.

Several visible and covered rocks are on the N side of the dredged channel. **Sow and Pigs,** across the channel from Kincheloe Point and nearly 500 yards off the N shore, is a rocky ledge that uncovers 1 to 6 feet. The ledge is dangerous when entering with a flood current, as the current sets toward it.

The current velocity is 3 knots in the entrance to Tillamook Bay.

Storm warning signals are displayed. (See chart.)

The Coast Guard has established a **rough bar advisory sign,** 28 feet above the water, visible from the channel looking seaward, on the structure of the Tillamook Bay Entrance Range Front Light, to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border and with the words **"Rough Bar"** in black letters. The sign is equipped with two quick flashing yellow lights that will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

Garibaldi, a lumber and fishing town, is on the N shore 2 miles inside the entrance. A black concrete stack and a silver elevated tank are conspicuous. There are several small fish companies at Garibaldi.

The town has a boat basin for commercial and sport fishing vessels. Berths for about 200 craft, electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available at the basin. A drydock in the basin can handle craft to 100 tons, 68 feet long, or up to 9 feet in draft; repair work must be arranged for independently of the drydock operator.

S of Garibaldi, unmarked **Bay City Channel** follows the E side of Tillamook Bay to the S end where it continues through narrow and crooked **Hoquarten Slough** to Tillamook, 11 miles above Tillamook Bay entrance. The channel has a depth of about 6 feet to Bay City, 4.4 miles above Tillamook Bay entrance, but S of this point depths are less than 3 feet to Tillamook. During freshets, snags are carried into the upper part of the bay where they form a menace to navigation.

Bay City has a small oyster cannery on an earth-fill pier. Fishing and crabbing are carried on in the vicinity, but all shipments are made by truck or rail.

Tillamook is noted for the production of cheese. It is the distributing center for a rich farming and dairying section.

Tillamook River empties into the S part of Tillamook Bay just W of the entrance to Hoquarten Slough. A fixed highway bridge with a clearance of 15 feet crosses the river about 0.7 mile above the mouth. A small marina is just S of the bridge; berths, gasoline, and marine supplies are available. Outboard engine repairs can be made. This marina is open only during the summer. Depths of about 2 feet can be carried in the river to the highway bridge.

Chart 18520.-From Tillamook Bay to Nehalem River, the coast is nearly straight for about 5 miles. Several lakes in this stretch are separated from the beach by wooded sand dunes. The heavily wooded hills begin to rise 0.5 mile to 0.8 mile from the beach and in 1 mile reach elevations of 1,000 to 1,600 feet.

Twin Rocks are 700 yards offshore and 2 miles N of the entrance to Tillamook Bay. Their bases are so close together that they usually look like one rock. The S and larger has an arch in it.

Chart 18556.-Nehalem River, 5 miles N of Tillamook Bay entrance, is tidal for about 10 miles from the entrance. Above this point the river is a mountain stream full of riffles and obstructed by boulders. The river constitutes a natural outlet for an extensive area of heavily timbered country. Lumbering and fishing are the principal industries. Sawmills are along the lower river.

COLREGS Demarcation Lines.-The lines established for the Nehalem River are described in 80.1360, chapter 2.

Nehalem Beach, the N point at the entrance, is a narrow sandspit, bare of trees, and with dunes of moderate elevation over the N part. The S side of the entrance is a low broad sand beach, backed by wooded country rising to elevations of 400 feet.

The entrance is protected by jetties extending 600 yards from the shoreline, though there are a number of breaks in the jetties. A whistle buoy is nearly 1 mile W of the entrance, and a private buoy marks the submerged W end of the S jetty. A private range marks the entrance channel. Mariners are advised to seek local knowledge before using the entrance channel because of seasonal changes.

The depths on the bar and within the bay are not sufficient for coastwise shipping; all lumber is shipped out by rail. The controlling depth is about 4 feet on the bar, and 3 to 8 feet to Wheeler. The channel is changeable.

Several marinas are at **Jetty,** on the E side of the river just inside the entrance, and along the river to Wheeler, 4.7 miles above the entrance. Berths, gasoline, water, ice, launching ramps, and marine supplies are available. Outboard engine repairs can be made at some of these marinas. The Coast Guard usually maintains a summer patrol station on the river at Jetty between May 1 and October 1.

Storm warning signals are displayed. (See chart.)

Brighton is a small settlement on the E shore, 1 mile inside the entrance to the river. **Wheeler,** 4.7 miles above the entrance, has an abandoned sawmill and wharf in ruins. All traffic is by rail and truck.

Nehalem is a small settlement on the W shore of the river, 6.3 miles above the entrance. A highway bridge over the river just below Nehalem has a swing span with a clearance of 21 feet. The bridge is kept in the closed position. (See 117.735, chapter 2, for drawbridge regulations.) Close S of this bridge is an overhead power cable with a clearance of 52 feet. A surfaced launching ramp is on the E side of the river 0.2 mile below the highway bridge.

Charts 18520, 18003.-The coast is low and sandy for about 3 miles N of Nehalem River entrance, then a dense forest begins which rises gradually to the S slope of Neahkahnie Mountain. There are grassy hillocks, 40 to 100 feet high, in the vicinity of the beach.

Cape Falcon, 17 miles N of Cape Meares and 10 miles S of Tillamook Rock, projects about 2 miles from the general trend of the coast. The seaward face, less than 0.5 mile in extent, is very jagged with numerous rocks under the cliffs. The SW point of the cape is composed of nearly vertical cliffs, 200 feet high, and is partially timbered. **Falcon Rock,** 0.7 mile W of the cape, is small and not very conspicuous.

Smuggler Cove, a small bight just S of Cape Falcon, is an excellent anchorage for small boats. The best anchorage is close to the N shore in 4 to 5 fathoms, protected from all except SW winds. Care should be taken to avoid two rocks, bare at extreme low water, that are about 150 yards from the N shore of the cove and rise abruptly from deep water.

Neahkahnie Mountain, 2.8 miles inland of Cape Falcon, is a prominent landmark, and the most important feature for locating Nehalem River. The W summit of the double-headed mountain is rounded and 1,900 feet high, but the E summit is serrated and divided into three peaks of nearly equal height. The entire SE slope is bare of timber, but is covered with grass and fern. The seaward face terminates in rocky broken cliffs over 500 feet high, and there are a few rocks about 100 feet from the beach. The two summits are visible from S; from N, the W summit hides the E and is very conspicuous.

NE of Cape Falcon, and 2 to 3 miles back from the shoreline, is a group of peaks; the highest and most prominent has a rounded summit, with a very gentle slope to the S and a more marked and abrupt drop to the N. It is very conspicuous from W in clear weather.

Arch Cape, rocky and precipitous, projects slightly from the general trend of the coast. It is the termination of a mountain ridge rising to 2,775 feet about 3 miles E. The cape is bare of timber. A high rock is close to the cape and connected with it at low water. A smaller rock is about 100 yards seaward of the larger. There are several other high rocks in the vicinity of the cape.

Castle Rock derives its name from its remarkable resemblance to a medieval castle with two towers, the taller of which is on the seaward end. It is about 0.8 mile W of the highest part of Arch Cape, and is the outermost bare rock. The upper part of the rock is covered with bird droppings and shows up very distinctly in sunlight. A rock awash is about 0.9 mile off the cape and 0.4 mile SW of Castle Rock; another rock, bare at lowest tides, is 0.5 mile offshore and 1 mile S of Castle Rock.

Hug Point is a small cliff close to the beach, 1.8 miles N of Arch Cape; the cliffs in its vicinity are above 180 feet high.

Double Peak, halfway between Cape Falcon and Tillamook Head, is the seaward end of a ridge extending E that reaches a height of 1,050 feet in less than 0.7 mile from the shore. It is heavily wooded and pitches abruptly to the sea, ending in a rocky broken cliff 100 feet high and 0.2 mile long. A rock is close to and abreast of the S end of the cliff; another rock is close to and abreast the N end. A ledge, with two rocks that uncover about 4 feet, is about a mile WSW of the highest part of the cliff.

From Double Peak, the coast extends N for 2.7 miles to the mouth of **Ecola Creek,** and then turns sharply NW for the same distance to the W point of Tillamook Head. The coast is high and wooded with broken cliffs bordered by numerous rocks, except at Cannon Beach at the mouth of Ecola Creek.

Haystack Rock, 1.5 miles N of Double Peak, is the largest of a cluster of rocks stretching out from the low-water line to 10 fathoms. A rock awash at low water and surrounded by about 9 fathoms is 0.8 mile SW of Haystack Rock.

Tillamook Head, 76 miles N of Yaquina Head, ends in two points which are 0.5 mile apart. The cliffs are 560 feet high at the S point and 1,000 feet high at the N point. A pinnacle rock is at the foot of the N cliffs, and extending offshore from it for 300 yards is a cluster of rocks, 45 to 150 feet high, the outer one being the lowest. The summit of the head is flat and densely wooded, with slightly lower land behind it.

Tillamook Rock, nearly 1.2 miles W of the S point of Tillamook Head, has an abandoned lighthouse and buildings on it. The W face leans a little seaward. A rock awash is between Tillamook Rock and the nearest part of Tillamook Head.

N of Tillamook Head the coast is a broad sand beach extending for 17 miles to Clatsop Spit, on the S side of the entrance to Columbia River. Low sandy ridges, covered with grass, fern, and brush, extend parallel with and back of the beach. **Necanicum River,** a small stream, empties at the summer resort of **Seaside,** 2.5 miles from the N side of Tillamook Head.

Saddle Mountain, double-headed and 3,283 feet high, is the landfall for the approach to the Columbia River. The mountain is 14 miles E of Tillamook Rock and is visible 50 miles offshore. From NW, the mountain appears to be triple-headed; the NE peak appears cone shaped, sharp, and lowest; the middle peak is irregularly cone shaped; and the S and highest peak is a flat-topped cone.

10. COLUMBIA RIVER, OREGON AND WASHINGTON

This chapter describes the Columbia River from its mouth at the Pacific Ocean to the head of navigation above Richland, Wash. Also described are its two major tributaries, the Willamette River in Oregon and the Snake River in Washington and Idaho. The deep-draft ports of Astoria, Longview, Portland, and Vancouver are described as well as many smaller ports.

Note: The nautical charts covering the Columbia, Willamette, and Snake Rivers show statute mile designations. However, the **distances** given in the text for these waterways are the **nautical miles** above their respective mouths with the statute mile equivalents shown in parentheses. Unless otherwise indicated, all other distances are given in nautical miles.

Mile 0.0, on the Columbia River, is at the junction of the Main Channel Range and a line joining the outer ends of the jetties. The distance to the mouth of the Columbia River from a position 0.5 mile W of the Columbia River Approach Lighted Horn Buoy CR is 5.8 (6.6) miles.

Conversion tables, nautical miles to statute miles, and statute miles to nautical miles are on page T-29. Mileage conversion scales are also shown on the nautical charts.

COLREGS Demarcation Lines.–The lines established for the Columbia River are described in 80.1365, chapter 2.

Caution.–The volcanic eruptions of Mount Saint Helens in mid-1980 caused extensive flooding with resulting heavy siltation in the lower Columbia River. Large amounts of mud, logs, and other debris entered Columbia River from Cowlitz River, just E of Longview at Mile 59 (68). In late 1980, dredging was done in the aforementioned area, however, mariners are advised to use caution in the Columbia River and its tributaries.

Rice Island, Miller Sands, Jim Crow Sands and Cottonwood Islands are used for dredging disposal sites. Elevations of these islands constantly change, as well as the overall shape and dimensions.

Charts 18003, 18007.–Columbia River rises in British Columbia, Canada, through which it flows for some 370 (425) miles before entering the continental United States in NE Washington. Thence it flows S to its junction with Snake River, from which it curves W and forms the boundary between the States of Washington and Oregon for the remainder of its course to the Pacific Ocean. Its entrance is 548 miles N of San Francisco and 145 miles S of the Strait of Juan de Fuca. The length of the river is 647 (745) miles in the United States. Between the Cascade Mountains, the river flows through a canyon averaging about 5 miles wide between high cliffs on each side; of this width, the river occupies about 1 mile, the rest being marsh, low islands, and lowlands. Near the mouth, the river becomes wider, and in some places is 5 miles across.

Columbia and Willamette Rivers are navigable by deep-draft vessels to Vancouver, Wash., and Portland, Oreg. Barges navigate the Columbia River to Pasco and Kennewick, Wash., 286 (329) miles above the mouth.

Navigation on the tributary Snake River, which joins the Columbia at Pasco, is possible to Lewiston, Idaho. The hydro-electric powerplants at the dams on the Columbia provide the major supply of electricity for the entire Northwest.

The commerce, both foreign and domestic, is extensive. The exports are principally logs, lumber, and forest products, grain, flour, chemicals, fruit, fish, general and containerized cargo, and general merchandise; the imports are coal, petroleum products, bulk salt, bulk cement, alumina, manufactured, and general and containerized cargo.

There are numerous settlements and landings, but Astoria, Oreg.; Longview, Wash.; Vancouver, Wash.; and Portland, Oreg. are the principal shipping points. The distances above the mouth of the Columbia River to these ports are, respectively, 12 (14) miles, 58 (66) miles, 92 (106) miles, and 97 (112) miles; Portland is on the Willamette River 9 (10.5) miles above its junction with the Columbia. A U.S. or Interstate Highway closely follows the S side of the Columbia River from Astoria to Portland to Pasco, Wash., and a Washington State Highway extends along or near the N bank from Skamokawa to Richland, Wash.

Prominent Features.–Columbia River Approach Lighted Horn Buoy CR (46°11.1'N., 124°11.0'W.), replacing Columbia River Lightship, is a large navigational buoy (LNB) about 5.3 miles SW of the entrance to Columbia River. The buoy shows a light 42 feet above the water. A fog signal, radiobeacon, and radar transponder beacon (Racon) are at the buoy. (See Racons, chapter 1, for additional information.)

Mount Saint Helens, nearly 8,500 feet high with a truncated-cone shape, is about 75 miles E of the entrance to the river. On a clear day it is visible when looking up the valley from seaward. **Mount Hood** and **Mount Adams** are lofty snow-covered peaks, which are also visible from parts of Columbia River on a clear day.

In 1980, several volcanic eruptions occurred from Mount Saint Helens. Mount Saint Helens' eruptions were the first in the continental United States since the volcanic eruption of Mount Lassen in northern California in 1915; both volcanoes are part of the Cascade Range.

Chart 18521.–Clatsop Spit, on the S side of the entrance, is a low sand beach, extending about 2.5 miles NW from Point Adams. There is a tendency for the shoal N of the spit to build up to the NW because of spring freshets and NW storms; vessels are cautioned to keep informed about conditions at the spit. A Coast Guard lookout tower, on the NW end of the spit, is prominent from the entrance.

Point Adams, just inside Clatsop Spit, is a low sandy point covered with spruce and undergrowth to the edge of the sand beach and low dunes. The point usually shows well from seaward, particularly if it is hazy inside.

Cape Disappointment, the rugged N point at the Columbia River entrance, is the first major headland along the 20 miles of sand beach N from Tillamook Head. It comprises a group of rounding hills covering an area 2.5 miles long and 1 mile wide, divided by a narrow valley extending NNW. The seaward faces of these hills are precipitous cliffs with jagged, rocky points and small strips of sand beach. **Cape Disappointment Light** (46°16.6'N., 124°03.1'W.), 220 feet above the water, is shown from a 53-foot white conical tower with white horizontal band at top and bottom, and black horizontal band in the middle, on the S point of the cape; a radiobeacon is at the station. A Coast Guard station is at Fort Canby on the E side of the cape.

Storm warning signals are displayed. (See chart.)

From the S, Cape Disappointment shows as three low knobs, separated by low flat ridges. North Head Light shows on the W slope of the W knob. From the W, the cape is not prominent, but it stands out clearly when there is fog, haze, or smoke inside the cape. From NW, the cape appears as a flat island with a slight depression in the center and a timbered knob at each end. From this direction, a low, flat hill with gently sloping sides between the cape and high ridges E appears as an island from a distance.

McKenzie Head, 0.8 mile NW of Cape Disappointment Light, is 190 feet high and nearly round. On its seaward face it is covered with grass and fern; bare of trees. On its E face it is heavily wooded with spruce.

North Head, the extreme W point of the cape, is 270 feet high, with a very jagged, precipitous cliff, backed by a narrow grassy strip; the higher ground behind it is covered with trees. **North Head Light** (46°18.0'N., 124°04.6'W.), 194 feet above the water, is shown from a 65-foot white conical tower on the W point.

The entrance to Columbia River is marked by two jetties. The S jetty extends 2.7 miles seaward from the NW end of Clatsop Spit; the westernmost mile of the jetty is submerged. The N jetty extends 800 yards seaward from the shoreline on the N side of the entrance. Lighted ranges, lights, buoys, and daybeacons mark the channels.

Channels.–Federal project depths in the Columbia River are 48 feet over the bar, thence 40 feet to the Broadway Bridge at Portland, Oreg.; 40 feet from the confluence of the Willamette and Columbia Rivers through the lower turning basin at Vancouver; and thence 35 feet through the upper turning basin at Vancouver. (See Notice to Mariners and latest editions of charts for controlling depths.) Additional information can be obtained from the Corps of Engineers, Portland, Oreg. (See appendix for address.)

Above Vancouver the Federal project depth is 27 feet for about 75 (86) miles to The Dalles, thence 14 feet for about 87 (100) miles to McNary Dam. The Federal project also provides for a 15-foot alternate barge channel which extends SE from the S side of the upper turning basin at Vancouver and connects with the 27-foot channel about 1 (1.2) mile upriver. Controlling depths throughout the river channels and basins may be considerably less than project depths. The depths over the lower sills of the locks at The Dalles, John Day, and McNary Dams may be the controlling depth for this stretch of the river; the least sill depth (at McNary Dam) will usually exceed 12 feet at normal pool level. In the pool above McNary Dam to Pasco and Kennewick, depths range from 14 to 115 feet. Navigation on the Snake River is possible to Lewiston, Idaho. (See Notice to Mariners and latest editions of charts for controlling depths.) Additional information can be obtained from the Corps of Engineers, Portland, Oreg. and Walla Walla, Wash. (See appendix for addresses.)

Depths.–Minimum depths are given at mean lower low water from the entrance of the Columbia River to Harrington Point, thence at Columbia River Datum to Bonneville Dam on the Columbia River, and Willamette Falls Locks at Oregon City on the Willamette River. **Columbia River Datum** is the mean lower low water during lowest river stages. The staff gage at the Columbia River Pilots' Office, at the foot of 14th Street at Astoria, Oreg., is set with zero at mean lower low water. The staff gages on the bars from Harrington Point to Portland, Oreg., are set with zero at Columbia River Datum. Above the Willamette Falls Locks, at Oregon City, depths of the Willamette River are at **Willamette River Datum.** Above Bonneville Dam depths of the Columbia River are referred to the normal pool level of the various dams on the Columbia River.

General anchorages are in the Columbia River. (See 110.228, chapter 2, for limits and regulations.)

Bridges and cables.–Clearances of bridges and cables over Columbia River and its tributaries are at **mean lower low water** below Harrington Point and at **Columbia River Datum** between Harrington Point and Bonneville Dam. Above Bonneville Dam the clearances are referred to the **normal pool level** of the various dams on the Columbia River. On the Willamette River above the Willamette Falls Locks, at Oregon City, clearances are referred to the datum of **Newburg Pool.** Minimum clearance of cable crossing the main channel of the Columbia and Willamette Rivers to Portland and Vancouver is 216 feet.

Caution regarding aids to navigation.–During the seasonal high-water conditions, aids to navigation may be destroyed or rendered unreliable. Mariners are warned to exercise caution in navigating the river and to obtain the latest information regarding aids to navigation by local inquiry and through local Notice to Mariners, available upon request to the Commander, 13th Coast Guard District, Seattle, Wash. Every effort is made to restore the aids to operating condition as soon as possible.

Weather.–The maritime climate near the Columbia River's mouth slowly turns continental as you head upstream. Temperatures become warmer in summer and colder in winter. Daily temperatures vary more. Rain and fog are less frequent, but the chance of snow is greater. In the Columbia River Gorge, winds are deflected and channeled by topography.

Average winter daytime temperatures vary from the upper forties near the mouth to the upper thirties near the Snake River junction. At night, this range is from the midthirties to the midtwenties. Cold spells occur with an outbreak of frigid Canadian air. Extreme temperatures range from the low teens near the coast to below zero upriver. Snow, of a significant amount, falls on 2 to 5 days each year, and is most likely upriver. Occasionally, an ice storm or "silver thaw" will occur; this happens most often between the Gorge and Vancouver. While winds are strongest in late fall and winter, they seldom reach gale force along the Columbia. Extremes of 75 knots have occurred; strongest winds are usually out of the S or SW. Wind flow is generally from the E through SE in winter, and wind speeds reach 17 knots or more about 5 to 10 percent of the time. However, locally at Troutdale, winds blow at 17 knots or more up to 30 percent of the time. Fog drops winter visibilities below 0.5 mile on about 3 to 6 days per month.

Spring temperatures rise slowly near the mouth of the Columbia, compared to the rise upriver. By April, daytime temperatures upriver average in the midsixties, while those near the mouth are in the midfifties. Average low temperatures are near 40°F everywhere. Rain and fog become less frequent than they were in winter. Gales are rare and winds of 17 knots or more blow less than 5 percent of the time except locally around The Dalles, where winds of 17 knots or more occur 18 to 25 percent of the time from April through August. By April, winds are generally out of the W through NW. Flooding on the Columbia is most likely to occur from April through June, when snowmelt at its headwater is most rapid. While flooding is kept under control, to a great extent, by multi-purpose dams, heavy rains during the melting season can trigger floods.

Summer winds remain W through NW and generally light. Near the mouth of the river, these maritime winds have a cooling effect. They keep average daytime temperatures below 70°F at Astoria and below 80°F at Portland. This effect diminishes upstream, and E of the Cascades daytime temperatures average close to 90°F. Lows at night fall into the low fifties near the coast and upper fifties inland. Rain falls on only a few days per month, usually in the form of showers or thunderstorms. Toward late summer, fog becomes a hazard near the mouth. At Astoria, visibilities fall below 0.5 mile on about 4 days in August.

Fog spreads upstream to Portland and Troutdale by September. During the fall, fog reduces visibilities to less than 0.5 mile on 4 to 8 days per month, W of the Columbia River Gorge. The difference in fog E and W of the Gorge does not extend to temperatures. The temperature range is smallest in fall. In October, daytime high temperatures range from the low sixties near the mouth to the midsixties upriver, while average low temperatures vary from the midforties near the coast to the low forties inland. By October, winds begin to blow more out of the E through SE and become stronger. While gales are infrequent, winds of 17 knots or more occur 4 to 10 percent of the time. Rain falls on about 5 to 15 days per month W of the Cascades and 2 to 6 days per month to the E.

Routes, Columbia River approach.–The lights at the entrance and at Willapa Bay 28 miles N, are distinguishing marks for determining a vessel's position and subsequent shaping of her course.

In thick weather, great caution is essential on the approach from any direction. The currents are variable and uncertain. Velocities of 3 to 3.5 knots have been observed between Blunts Reef and Swiftsure Bank, and velocities considerably in excess of those amounts have been reported. Under such conditions, vessels should keep outside the 30-fathom curve until Columbia River Approach Lighted Horn Buoy CR (LNB) has been made. Care should be taken not to mistake the low sand beach N of Cape Disappointment for that S of Point Adams. Nearly all the vessels which have gone ashore attempting the entrance have been wrecked N of the mouth, in the vicinity of Peacock Spit.

In clear weather, vessels should have no difficulty in entering the river as the aids to navigation are numerous. In thick weather, however, when aids cannot be seen, strangers should not attempt to enter without a pilot.

Local vessels entering in thick weather and with a rising tide, as a rule, do not attempt to pass beyond Desdemona Sands Light, because of the difficulty under such circumstances of avoiding vessels anchored in the narrow channel above the light. Strangers should not attempt to navigate the river at night.

Dredges will usually be found at work in the channels; these dredges should be passed with caution and reduced speed. (See 162.225, chapter 2, for navigation regulations.)

Weather.–An estimate of bar conditions, visibility, and weather may be obtained by radio from the Coast Guard station at Cape Disappointment.

Tides.–Mean ranges of tides on the Columbia River range from 6.7 feet at Youngs Bay, E of Astoria, to 3.3 feet at Longview, Wash., to 1.3 feet at Vancouver, Wash. (See Tide Tables for mean and diurnal ranges at selected points along the Columbia River.)

Currents.–The currents in the Columbia River and approaches are described in the Tidal Current Tables.

Caution.–The Columbia River bar is reported to be very dangerous because of sudden and unpredictable changes in the currents often accompanied by breakers. It is reported that ebb currents on the N side of the bar attain velocities of 6 to 8 knots, and that strong NW winds sometimes cause currents that set N or against the wind in the area outside the jetties.

In the entrance the currents are variable, and at times reach a velocity of over 5 knots on the ebb; on the flood they seldom exceed a velocity of 4 knots. The current velocity is 3.5 knots, but this tidal current is always modified both as to velocity and time of slack water by the river discharge. On the flood there is a dangerous set toward Clatsop Spit, its direction being approximately ESE; on the ebb the current sets along the line of buoys. Heavy breakers have been reported as far inside the entrance as Buoy 12, S of Sand Island.

(See the Tidal Current Tables for daily predictions.)

Freshets.–The annual high-water freshet stage on the Columbia occurs in the latter part of May, but on Willamette River the peak-flow period usually begins mid-December and continues through February, according to measurements taken by the U.S. Geological Survey over the past 70 years. Thus, the Willamette is low or nearly so at the time of the peak flow on the Columbia in late May. This causes the Willamette to apparently change direction under the influence of the stronger flow or "backup" from the Columbia, which change is apparent at least as far up the Willamette as the city of Portland.

On Columbia River, the freshet flow causes some shoaling in the dredged cuts, but redredging is done to maintain project depths.

Since logging is one of the main industries of the region, free floating logs and submerged deadheads or sinkers are a constant source of danger in the Columbia and Willamette Rivers. The danger is increased during spring freshets. **Deadheads** or **sinkers** are logs which have become adrift from rafts or booms. One end of the sinker settles to the bottom while the other end floats just awash, rising and falling with the tide.

Ice forms occasionally in both the Willamette and Columbia Rivers, but it is seldom heavy enough to affect navigation seriously.

Pilotage.–Pilotage across the Columbia River bar and up or down the river is compulsory for vessels engaged in the foreign trade. Pilotage is provided by the Columbia River Bar Pilots. Pilotage should be requested in advance by telephone to their pilot station in Astoria (503-325-2641) or by wire through radio station KLB, Everett, Wash. Advance notice of at least 12 hours prior to arrival at Columbia River Approach Lighted Horn Buoy CR is required. In addition, if the arrival time will change by more than 1 hour, the pilot station should be notified. One message to the bar pilots will assure that a river pilot is also available at the time requested.

The bar pilots maintain one of two pilot boats on call at all times, the PEACOCK or the COLUMBIA; both vessels maintain a continuous watch on VHF-FM channels 13 (156.65 MHz) and 16 (156.80 MHz), and on 2182 kHz for 15 minutes after each hour. VHF-FM channels 13 and 16 may also be used to contact the pilot station. The pilot boats working frequencies are VHF-FM channels 13 and 16, and the working frequencies of the pilot station are VHF-FM channels 13, 16, and 18 (156.90 MHz). The radio call for the pilot office is KOK-360.

The COLUMBIA, which operates in good to moderate weather, is 86 feet long and has a white hull and a white and orange superstructure with the word PILOT prominently displayed on the side of the house.

The PEACOCK, which operates during bad or threatening weather and in the winter, is 87 feet long, has a white hull, green deck, and a white and orange superstructure with the word PILOT prominently displayed on the side of the house.

To assist the pilot in boarding, vessels are requested to contact the pilot boat about 30 minutes prior to arrival for boarding instructions. When the COLUMBIA is on station, the pilot ladder should be rigged 10 to 12 feet above the waterline; when the PEACOCK is on station, the pilot ladder should be rigged 4 feet above the waterline. The ladder should be rigged approximately amidships, on the side designated by the pilot boat, and over the draft marks clear of all discharges and obstructions; it should be well lighted at night.

The pilotage boarding area is 1 mile E of the Columbia River Approach Lighted Horn Buoy CR; the bar pilotage ground extends from the open sea, at least 10 miles beyond the outermost buoy, to Tongue Point, E of Astoria. The river pilotage ground extends from the lowermost dock or wharf at the port of Astoria to the head of navigation on the Columbia or Willamette Rivers and their tributaries. The transfer of a bar pilot to a river pilot is made off Astoria. The radio code word for Columbia River Pilots is COLRIP. The whistle signal for a bar pilot is one long, two short, and one long blasts; the whistle signal for a river pilot is one long and three short blasts.

A fixed amber light is maintained by the Columbia Bar Pilots, in cooperation with the Coast Guard, on the outer end of the pier on the W side of Tongue Point. When this light is exhibited it will inform outward bound vessels that desire a bar pilot that the bar is not passable and that the vessel should anchor. A flashing amber light to supplement the fixed light is maintained by the Bar Pilots atop the pilot office at Astoria.

Baker Bay is a shoal open bight, E of Cape Disappointment, formed by the cape and the recession of the land N. **Sand Island**, low and flat, fronts the bay on the SW side.

A dredged channel leads N from the Columbia River along the W side of Sand Island thence to the Port of Ilwaco mooring basin about 3 miles above the entrance. The entrance is between two detached jetties marked at the channel ends by lights. The channel is marked by lights and daybeacons.

In May-November 1981, the controlling depth was 8 feet to Fort Canby, thence 5 feet (7 feet at midchannel) to the Port of Ilwaco mooring basin. In 1958, a depth of 10 feet was available in the basin. The entrance is subject to continual change. As there is usually a swell here, the channel should be navigated only at high water with local knowledge. The rest of Baker Bay is covered with shoals and abandoned fish traps.

Ilwaco is the base for a large commercial and sport fishing fleet. Gasoline and diesel fuel, ice, water, and other supplies are available. The largest marine railway can handle vessels up to 65 feet, 100 tons, or 18 feet wide for hull and engine repairs. Machine and carpentry shops are at this boatyard. The **Port of Ilwaco** administers the docks and facilities of the port.

Storm warning signals are displayed. (See chart.)

Desdemona Sands, marked by a light near the W end, is a shoal area extending SE for about 8 (9.2) miles from just inside the entrance to Columbia River. Desdemona Sands has the main river channel to the S and a secondary channel to the N.

Fort Stevens Wharf, at Mile 7.3 (8.4) on the Oregon side, is marked by a light and fog signal on a dolphin off the end. A special radio direction finder calibration station is at the light. (See Light List for details.) The wharf is in ruins. A boat basin is at **Hammond,** 0.2 mile SE of the wharf. Its entrance is marked by a light and a daybeacon on the east and west jetties, respectively. Depths inside are about 6 feet. Berths with electricity, for about 200 craft, gasoline, diesel fuel, water, ice, and a launching ramp are available at the basin.

The pier of the former Coast Guard station is just E of the Hammond boat basin. A packing plant wharf is E of the former Coast Guard pier.

Warrenton, on the **Skipanon Waterway** at Mile 9.5 (11), is the base of a large sport fishing fleet. The largest marine railway here can handle vessels up to 115 feet, 150 tons, 23-foot wide, or 12 feet in draft for hull and engine repairs. Several marinas are on the waterway, and a mooring basin is in the E part of the waterway about 1.2 miles above the entrance. Floats for about 300 craft, gasoline, diesel fuel, water, ice, and marine supplies are available.

In 1980-May 1981, the controlling depth from the entrance of Skipanon Waterway to the turning basin just below the railroad bridge at Warrenton was 7 feet at midchannel, thence in 1978-January 1980, 6 feet in the turning basin, thence in January 1980, 6 feet to the railroad bridge. Depths are about 5 feet above the railroad bridge; this part of **Skipanon River** is used for logging operations. The channel to the turning basin is marked by a **198°30′** lighted range; an unlighted buoy and lights mark the channel entrance.

Above the waterfront area, the river is crossed by a railroad swing bridge and a fixed highway bridge; the least clearance is 10 feet above mean lower low water, and the least width is 33 feet. A power cable at the second bridge has a reported clearance of 25 feet. (See 117.740 (a)(5), chapter 2, for drawbridge regulations and opening signals.)

Scarboro Hill, 820 feet high, is on the Washington side about 7 (8) miles E of Cape Disappointment. It is a long, gradually rising ridge, covered with grass, fern, and some trees. A number of conspicuous light-colored buildings of the historical Fort Columbia State Park may be seen near the base of the hill.

A dredged marked channel leads from Columbia River near the E end of Baker Bay to a basin at **Chinook,** on the Washington side. In November 1981, the midchannel controlling depth was 5 feet except for shoaling to bare on the SE side of the channel in the vicinity of Light 2. In 1973, depths of 10 feet were reported available in the basin. Berths, gasoline, diesel fuel, water, ice, a launching ramp, and some marine supplies are available at the basin. A packing company wharf is at the basin. A 5-ton hoist is available for handling small craft, and a tidal grid for hull repair work.

Smith Point, at Mile 11.3 (13.0) on the Oregon side, is the W termination of a high, wooded ridge; it is the first prominent point on the S bank SE of Point Adams. The ridge culminates in **Coxcomb Hill,** 595 feet high, behind Astoria. The Astoria Column on the top of the hill is prominent.

Youngs Bay is a shoal body of water just W of Smith Point. It receives the waters of **Youngs River** and **Lewis and Clark River.** The docks of a marine repair yard are 0.5 mile above the highway bridge crossing the Lewis and Clark River. The yard can handle vessels up to 400 tons in weight, 33 feet wide, and 15-foot draft for hull and engine repairs. Traffic on the two rivers is confined chiefly to tugs handling log rafts just above the highway bridges. Small tugs operate to the town of **Olney** on Youngs River at high tide. A powerhouse with a prominent white concrete stack is on the N shore of the bay, just W of the highway bascule bridge.

Reported depths of about 7 feet can be taken to and inside Lewis and Clark River. In May 1981, the controlling depth was 6 feet in the improved channel through Youngs Bay to the bascule highway bridge at the entrance to Youngs River; deeper water can be found inside.

Youngs Bay is crossed by a vertical-lift highway bridge with clearances of 45 feet down and 80 feet up, about 0.3 mile above the mouth. The railroad swing bridge, just above the lift bridge, has a clearance of 17 feet. The highway bascule bridge, 2.1 miles above the bay entrance at the entrance to Youngs River, has a clearance of 24 feet. (See 117.740 (a) (1), (2), and (3), chapter 2, for drawbridge regulations and opening signals.) The least clearance of overhead cables across Youngs River to about 4 miles above the mouth is 103 feet.

Over Lewis and Clark River, 0.8 miles above the mouth, is a highway bascule bridge with a clearance of 25 feet. The power cable at the bridge and the one 1.8 miles above the mouth have a least clearance of 64 feet. The highway bridge, 4.8 miles above the mouth, has a fixed span 18 feet wide with clearance of 10 feet. (See 117.740 (a)(4), chapter 2, for drawbridge regulations and opening signals.) Clearances and depths on Youngs River and Lewis and Clark River are at **mean lower low water.**

Point Ellice, on the Washington side 11 (12.7) miles inside the entrance, is the termination of a spur from the mountain ridge back of Scarboro Hill. The point is rounding and rocky, but not high. Two high hillocks lie behind the point. In this area there are many abandoned fish traps and pile structures that extend into the river.

Astoria, at Mile 12 (14) on the Oregon side, extends from Youngs Bay to Tongue Point. It is the principal city on the Columbia River below Longview, Wash. It has connections with the interior by both rail and highway.

General anchorages are N and W of Tongue Point. (See 110.1 and 110.228, chapter 2, for limits and regulations.) Harbor regulations prohibit vessels from anchoring more than 1 hour within an area bounded on the S by the Astoria waterfront and on the N by the main channel buoys. Temporary anchorage may be had by any vessel of suitable draft just E of Buoy 19, NW of Desdemona Sands Light.

The fixed highway bridge between Astoria and Point Ellice has a clearance of 205 feet at the center over the main channel and 48 feet over the N channel. A private fog signal is sounded from the bridge support pier just N of the main ship channel.

Tides.–The mean range of tide at Astoria is 6.5 feet, and the diurnal range of tide is 8.2 feet. A range of about 12 feet may occur at the time of maximum tides. (See the Tide Tables for daily predictions at Astoria (Tongue Point).)

Currents.–Above Astoria the current velocity is 1 to 3 knots except during the freshet period when the ebb is considerably increased although not enough to affect navigation seriously.

Weather.–Astoria's perennially verdant landscape is hemmed by rather low mountains on the N, E, and S. On the W it is open to the Pacific Ocean over 4 miles or more of low green dunelands and the last 10 miles of the Columbia River.

Weather hazards occasionally occur. Storms may sink or wreck ships. Even in fair weather, wind and wave may combine to produce a type of breaker known as the "widow-maker" and swamp a boat. Heavy rains inundate lowlands, and high tides aggravated by gales may push seawater across highways and up beaches. Rains may cause earthslides, mostly in highway cuts. Storms may fell trees or break power and phone lines. Lightning strikes are rare. Showers of small hail may briefly whiten the ground during many of the months. Occasionally in winter there may be rather brief periods of freezing temperatures, with snow or ice.

The climate is generally healthful, except for dampness and a dearth of isolation in winter. Even then, the gloomy spells of cloud and driving rain may be broken by bright sunshine. Alike relaxing are the cool breezes, waters, fog, and warm sands of summer; and the roaring seas and storms with their rainy balmy nights in winter. Heat waves are uncommon and usually brief. The washed atmosphere stays remarkably clean and fresh.

The National Weather Service maintains an office at the Clatsop County Airport; **barometers** may be compared there.

(See page T-7 for **Astoria climatological table.**)

Towage.–Tugs to 2,000 hp are available at Astoria. Arrangements for tugs are usually made in advance by ships' agents. Barges of several sizes are available at all times. The SALVAGE CHIEF, a 200-foot salvage tug, is moored at the East Mooring Basin in Astoria.

Astoria is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard.–A Coast Guard Cutter is stationed at Astoria.

Harbor regulations are prescribed by the Port of Astoria Board of Commissioners. The direct operation of the port is controlled by a port manager who is appointed by the Board.

Wharves.–The Port of Astoria is a municipal corporation embracing all of Clatsop County, as a port district, and on the Columbia River extends from the mouth of the river to Westport, about 38 (44) miles above the mouth. The port owns a substantial part of the waterfront at Smith Point, and operates a well-equipped modern terminal of three piers with nine deep-draft berths. The port offices are at the head of Pier 1, the easternmost pier. Depths of 35 feet are reported alongside all berths; for information on the latest depths contact the port authorities. The deck height at all piers is 16 feet. Water and electrical shore power connections are available at all berths; the three piers are served by the Burlington Northern Railroad. General cargo at the port is usually handled to and from vessels by ships' tackle. Cargo on the wharves is handled by port-owned forklifts, dock tractors, and other miscellaneous cargo handling equipment. For a complete description of the port facilities refer to Port Series No. 33, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Pier 1 (46°11'22"N., 123°51'27"W.): face, 650-foot berthing space; W side, 1,100-foot berthing space; 1-million-bushel grain elevator (railroad cars to elevator, unloading capacity 8,000 bushels per hour), two spouts at end of gallery from elevator for loading vessels, capacity 20,000 bushels per hour; 167,000 square feet, sprinkler protected, covered storage; receipt and shipment of plywood, frozen fish, grain.

Pier 2 (46°11'20"N., 123°51'36"W.): face, 425-foot berthing space, W side, 1,445-foot berthing space, E side, 1,307-foot berthing space; open pier with 600,000 square feet of area; pipelines on pier for bunkering vessels; receipt and shipment of lumber, logs, general and bulk cargo.

Pier 3 (46°11'16"N., 123°51'45"W.): E side, 1,750-foot berthing space; 248,000 square feet, sprinkler protected, covered storage; barge ramp capable of handling loads to 15 tons and used for transfer of cargo from ship to barge or vice versa serves the outer berth of pier 3; receipt and shipment of canned goods, wood pulp, paper products, general cargo.

Supplies.–Most marine supplies and services are available at Astoria. Facilities for bunkering ocean-going vessels are maintained at Pier 2. Heavy fuel oil is delivered at 1,500 barrels per hour, and diesel oil is delivered at 800 barrels per hour.

Repairs.–The largest marine railway in the Astoria area can handle vessels to 400 tons, 33 feet wide, or 15-foot draft for hull and engine repairs. Machine shops and a carpentry shop are at the yard, 1.3 (1.5) miles above the mouth of the Lewis and Clark River. Another large shipyard, just E of the N end of the Youngs River bascule bridge, has three marine railways the largest of which can handle craft to 200 tons in weight, 100 feet long, 24 feet wide, or 12-foot draft. Complete hull, engine and electronic repairs can be made. Complete salvage equipment is available in Astoria.

Small-craft facilities.–Two mooring basins for small craft and fishing vessels are maintained by the Port of Astoria. The West Basin, 0.3 (0.3) mile W of the S end of the Astoria Bridge, has 15 feet reported through the entrance and depths of about 6 feet at the floats. About 425 berths with electricity, gasoline, diesel fuel, water, ice, and some marine supplies are available. Engine repairs can be made at several private firms on the basin. A 10-ton hoist at a packing company just W of the basin can handle small craft in emergencies. The East Basin, 2 (2.3) miles E of the Astoria Bridge, has berths for about 50 craft and a launching ramp; however, no services are available. Reported depths of 15 feet through the entrance and 10 feet at the floats are available.

Communications.–U.S. Highway 101 extends N and S from Astoria, and U.S. Highway 30 extends inland to Portland, Oreg. Astoria is served by the Burlington Northern Railroad. The Clatsop County Airport, S of Youngs Bay, is served by a domestic airline and handles passengers and freight.

Tongue Point, at Mile 16 (18) on the Oregon side, is a bold, rocky peninsula, 308 feet high, covered with trees and connected with the S bank by a low, narrow neck; it projects into the river for 0.8 mile. A buoy depot of the Coast Guard is on the W side of the peninsula near its inner end. On the E side are the concrete piers of the former naval base. Logs are now stored between all but the two northernmost piers. The Corps of Engineers dredge BIDDLE moors at the second pier from the N end.

Cathlamet Bay lies E of Tongue Point and S of the Main Ship Channel. There are many islands which are covered with tule in the summer, but in the winter they are almost indiscernible. The **John Day Channel** extends between Tongue Point and **John Day Point.** At the junction with the **John Day River,** just N of the point, the name changes to **South Channel,** which follows the shore closely to and around **Settler Point** to **Svensen.** These channels are marked by buoys and daybeacons. The power cables across John Day River have a least clearance of 30 feet at mean lower low water. (See 117.1b and 117.759b(a) through (d) and (f)(10), chapter 2, for drawbridge regulations and opening signals of bridges across John Day River.) Many houseboats are moored along John Day River. The E part of Cathlamet Bay (chart 18523) is used mostly for logging operations and log storage.

Grays Bay on the Washington side extends from **Grays Point** to **Harrington Point** N of the Main Ship Channel. In the NE section of the bay are extensive mud flats. In 1978, a submerged rock was reported in about 46°17'16"N., 123°43'34"W.; caution is advised. **Deep River** flows into the N part of the bay. The channel is marked and follows the shore from Grays Point around **Portugese Point** and **Rocky Point.** This river is used only by small pleasure craft and sport fishermen and for logging operations. Depths of about 6 feet are available for about 2 miles above the mouth, above which it is shoal and probably good for no more than 2 feet.

Grays River, entered just E of Deep River, is another small stream used only by pleasure craft. Depths are not more than 2 feet, and much of the stream is blocked by snags and sunken logs.

Chart 18523.–Between **Harrington Point,** Mile 20.5 (23.6), and **Crims Island,** Mile 47.5 (54.6), Columbia River main channel follows the N bank to **Three Tree Point,** thence swings around the bend, holding to the NE shore as far as **Hunting Islands,** where it swings along the S shore until off the SE end of **Puget Island;** thence it follows the N bank from **Cape Horn** past **Abernathy Point** and N of Crims Island and **Gull Island.**

Currents.–In this section the current velocity is about 1 knot. Because of the river flow, which combines with the current, the upstream flow is weak or nonexistent and the downstream flow attains velocities of 2 to 3 knots.

Local magnetic disturbance.–Differences of as much as 3° from the normal variation have been observed along this section of the river.

Steamboat Slough, NE of **Price Island** at Mile 29.3 (33.7) on the Washington side, and **Elochoman Slough,** on the E side of Hunting Islands at Mile 31.3 (36), are used by fishing boats, tugs, and for log storage. Gasoline and diesel fuel are available at **Skamokawa** just above the NW end of Steamboat Slough. A small marine railway, owned by a private packing firm, can be used if prior arrangements are made.

At Mile 35 (39.9), a power cable with a least clearance of 221 feet crosses the main channel to Puget Island. The tower on the E side of the channel on Puget Island is prominent.

Cathlamet Channel joins the main channel at Mile 32.3 (37.2) on the Washington side. It is used by fishing boats, tugs, log rafts, and barges, and for some log storage above the city of **Cathlamet.** A dredged section of Cathlamet Channel leads SE from the main river channel to a fixed highway bridge at Cathlamet. In November 1981, the controlling depth was 10 feet. A mooring basin is at Cathlamet; gasoline and diesel fuel are available. A fixed highway bridge crosses the channel from Cathlamet to Puget Island; the clearance is 74 feet for the N span. A power cable, 0.5 (0.6) mile above the bridge, has a clearance of 97 feet.

A large wharf with warehouses and a wood chip loading barge berth are at the Crown Zellerbach Corp. installation at **Wauna,** on the Oregon side, at Mile 36.2 (41.7). Wood chips and sawdust are received here and paper products are shipped out; all traffic to the wharf is by barge. The wharf is marked by a private light on its NW end. The woodchips are offloaded from barges by a rapid handling automatic unloader.

Westport Slough, at Mile 37.4 (43) on the Oregon side, leads to a ferry dock at the village of **Westport.** A lumbermill wharf, in ruins, is just E of the ferry slip. In November 1979, the midchannel controlling depth to the ferry dock was 27 feet. The ferry operates between Westport and the ferry landing 0.5 mile N of **Pancake Point** on Puget Island, and carries passengers and automobiles. Above Westport the slough is used for log storage; about 7 feet can be carried to **Kerry,** 2.4 miles above the mouth. Overhead power cables 0.8 and 1 mile above the mouth of the slough have clearances of 74 and 76 feet, respectively.

Wallace Slough, at Mile 41 (47) S of Wallace Island, is used by cannery tenders, fishing boats and house floats. A depth of 4 to 5 feet can be carried through the slough.

Beaver Slough enters Wallace Slough near the SE end of Wallace Island. The slough is used by fishing boats and house floats. A fixed bridge with a 14-foot span and clearance of 6 feet crosses the W arm of the slough near its mouth.

Clatskanie River is a tributary of Beaver Slough. A railroad swing bridge, about 0.6 mile above the mouth, has a clearance of 16 feet through the E draw. (See 117.740 (a) (9) and (b), chapter 2, for drawbridge regulations and opening signals.) There is a wharf at **Clatskanie;** gasoline, diesel fuel, water, and a launching ramp are available. Several sawmills are along the river. Logs are stored and towed by small tugs. In September 1979, depths of about 3 feet could be carried through Beaver Slough to the mouth of Clatskanie River; thence in August 1979, 1 foot could be carried in the river to the town of Clatskanie; local knowledge is advised. Numerous shoals have been reported in Beaver Slough and Clatskanie River.

Port Westward, a former Army ammunition terminal, is the site of a general cargo and log export terminal. The main wharf, just W of the entrance to Bradbury Slough, is 1,200 feet long, has 40 feet reported alongside and a deck height of 20 feet, and is used for shipment and receipt of general cargo.

Bradbury Slough, at Mile 46.6 (53.6) SW of Crims Island, has depths of 9 feet as far as the upper end where it shoals to 3 feet. There is extensive log storage along the Crims Island shore. Two former log loading berths are on the S side of Bradbury Slough just inside the entrance. They have 600 feet of berthing space and 40 feet reported alongside. At these berths, logs are loaded on vessels by floating cranes.

Chart 18524.–Between Crims Island and Saint Helens, Mile 75 (86), the main channel starts its SE swing, passing S of **Fisher Island** and **Hump Island,** and N of **Walker Island** and **Lord Island;** thence, under the Longview fixed bridge, thence W of **Cottonwood Island,** E of **Sandy Island,** and W of **Martin Island** and **Burke Island.** Numerous jetties along this stretch are usually marked by lights or daybeacons.

Currents.–In this section, the average velocity on the ebb is 2.0 knots; current usually does not flood.

Local magnetic disturbance.–Differences of as much as 8° from the normal variation have been observed along this section of the Columbia River.

Coal Creek Slough, at Mile 48.9 (56.3) on the Washington side, empties into the river at **Stella.** Gasoline is available. The slough is used for log-raft storage and moorage of small craft. Depths over the bar are 3 to 4 feet, but deeper water extends nearly 3 miles above the entrance. Power cables over the deeper part of the slough have a least clearance of 65 feet.

Fisher Island Slough, N of Fisher Island, is used as the Longview Yacht Basin, by small fishing vessels, and as log-storage grounds. A depth of 7 feet may be carried through the channel.

Power cables over the main channel at Mile 54.2 (62.4), at Lord Island, have a least clearance of 216 feet.

The channel between Walker Island and the Oregon shore is used for log-raft storage. The shoal area, N of **Dibblee Point,** limits the maximum depth which may be carried through the entire channel to about 7 feet. The power cables S of Lord Island have a least clearance of 115 feet.

The **Longview Bridge,** at Mile 57.3 (66.0) between Longview and Rainier, has a fixed span with a clearance of 185 feet. Fog signals are on the two piers of the bridge.

Longview, at Mile 57.3 (66) on the Washington side is a major river port. Papermills, lumbermills, and an aluminum plant are in the city. The lumbermills here are said to be the world's largest. Waterborne commerce includes grain, lumber and wood products, flour, alumina and aluminum ingots, petroleum products, and general cargo.

Prominent features.–The Longview Bridge with its high towers is easily the most prominent feature in approaching Longview from either up or down the river. Upon closer approach, the many stacks and tanks of the mills can be identified; most are charted.

Anchorages.–Deep-draft vessels may anchor NW of the Longview Bridge between the main ship channel and the smaller channel N of the main channel. A secondary anchorage, SE of the bridge and just S of the main ship channel, may also be used. Depths in these anchorages range from 30 to 38 feet. Care should be exercised not to obstruct the dredged channels.

Tides and currents.–The mean range of tide at Longview is 3.3 feet. Average current velocity, on the ebb, at Longview is 2.0 knots.

(See beginning of chapter (Astoria) for **pilotage** information.)

Towage.–Tugs to 2,200 hp are available at Longview; however, they are usually not necessary for docking or undocking.

Longview is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Harbor regulations.–The Port of Longview is a municipal corporation governed by a board of commissioners and administered by a port manager.

Wharves.–The deep-draft facilities at Longview include the four wharves and seven berths operated by the Port of Longview, and the privately owned and operated facilities of two large paper companies and an aluminum plant. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 33, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) Depths alongside the port-owned wharves are reported to be maintained at 30 to 35 feet; for information on the latest depths contact the port authorities or private operators. All the facilities described have direct highway connections and plant trackage with direct railroad connections. The port-owned properties have a total covered storage area of 18.7 acres and open storage area of 50 acres. Water and electrical shore power connections are available at the port wharves and some of the private facilities. Special handling equipment, if available, is mentioned in the description of the particular facility. Shore-based hoisting equipment with capacity up to 660 tons is available.

Port-operated facilities:

Berths 1, 2, 3, and 4: just E of the Longview Bridge; 2,155-foot berthing space; deck height, 30 feet. Berth 4, the easternmost berth, is used for loading grain; it has a grain elevator with a capacity of about 8 million bushels, a loading rate of over 29,000 bushels per hour, and an unloading rate of 12,500 bushels per hour. A 1,200-ton capacity bulk liquid plant serves the wharf. Two traveling gantry cranes of 50 and 65 tons capacity, and a 660-ton derrick for heavy lifts are available. A railroad car tipper and a hydraulic truck dumper provide rapid loading and unloading between ship, truck, and railroad car.

Berth 5, just E of Berth 4; 680-foot berthing space with dolphins; deck height, 20 feet; hoppers and belt conveyors unload bulk alumina to storage tanks of 25,000-ton capacity. Logs are also loaded here.

Berths 6 and 7, just E of Berth 5; 1,500-foot berthing space; deck height, 29 feet; 50-ton mobile gantry crane serves the entire length of Berths 6 and 7; Berth 7 is used for shipment of chips; Berth 6 is used for shipment of general cargo.

Private facilities:

Reynolds Metals Co. Wharf (46°08'08"N., 123°00'03"W.): 1,080-foot berthing space with dolphins; 38 feet alongside; deck height, 30 feet; receipt of alumina; owned and operated by Reynolds Metals Co.

Weyerhaeuser Salt Discharge Wharf (46°07'44"N., 122°59'20"W.): 730-foot berthing space with dolphins; 32 feet alongside; deck height, 26 feet; bulk salt transferred by ship's tackle to wharf and moved to a conveyor system by bulldozers; owned and operated by Weyerhaeuser Co.

Weyerhaeuser Lumber Wharf (46°07'34"N., 122°58'55"W.): 1,185-foot berthing space with dolphins; 35 feet alongside; deck height, 26 feet; shipment of pulp and lumber; owned and operated by Weyerhaeuser Co.

Weyerhaeuser Wood Chip Berth (46°06'52"N., 122°58'08"W.): 1,475-foot berthing space with dolphins; 35 feet alongside; deck height, 29 feet; served by a 1,700-foot pneumatic chip loader; owned and operated by Weyerhaeuser Co.

Weyerhaeuser Log Export Wharf (46°06'33"N., 122°57'35"W.): 1,320-foot berthing space with dolphins; 35 feet alongside; deck height, 21 feet; shipment of logs; owned and operated by Weyerhaeuser Co.

Note: The four Weyerhaeuser facilities NW of the Longview Bridge are reached by a side channel. In June 1980, the channel was partially blocked by volcanic ash from the eruptions of Mount Saint Helens. Passage information can be obtained from Portland Coast Guard. The channel is marked by a **115°** lighted private range.

International Paper Co. Chip Berth (46°05'59"N., 122°56'15"W.): 1,185-foot berthing space with dolphins; 35 feet alongside; vessels loaded by pneumatic chip loader; shipment of wood chips; owned and operated by International Paper Co.

Supplies.–Provisions and some marine supplies and services are available. Fuel oil and water are available at the wharves.

Repairs.–There are no facilities for major repairs to large oceangoing vessels in Longview; the nearest such facilities are in Portland. Some above-the-waterline repairs can be made, and there are several machine shops in the city. The Port of Longview has cranes to 65-ton capacity which can be used to lift private craft if prior arrangements are made.

Communications.–Longview is served by Interstate Highway 5 and U.S. Highway 30, and by three transcontinental railroads.

Cowlitz River flows into Columbia River at Mile 59 (68), just E of Longview. Only small craft and pleasure craft ply the river. In July 1981, the controlling depth in the entrance channel was 3 feet to the railroad bascule bridge about 1.4 miles above the entrance, thence with local knowledge 1 foot to Kelso. The controlling depth is less than 1 foot above Kelso. An unlighted range, a light, and daybeacons, mark the entrance to the river. The tide varies from 4 feet at the mouth to zero at **Ostrander,** 7.8 miles above the mouth. At Kelso a stage of 20 feet is reached during ordinary freshets and a stage of 25 feet at extreme floods.

Minimum clearance of the drawbridges across Cowlitz River between the mouth and Ostrander is 25 feet; minimum clearance for fixed bridges is 63 feet. Several overhead power and television cables cross the river between the entrance and Ostrander; least clearance is 67 feet. (See 117.1b and 117.765 (a) and (b)(2), chapter 2, for drawbridge regulations and opening signals.)

At **Kelso** there are several private wharves including a sand and gravel wharf, a public landing, and several small craft floats, at one of which gasoline is available.

Rainier, on the Oregon side opposite Longview, has a large sawmill. Lumber is shipped from a 475-foot wharf with reported depths of 32 feet alongside and a deck height of 22 feet. The town of Rainier operates a small-craft basin; berths, gasoline, water, ice, and a launching ramp are available. Diesel fuel may be obtained at the tugboat moorage just E of the city basin. A marine railway that can handle vessels to 100 feet in length is at Rainier. In June 1980, the side channel leading to the waterfront facilities was partially blocked by volcanic ash from the eruptions of Mount Saint Helens. Passage information can be obtained from Portland Coast Guard.

Carrolls Channel, between Cottonwood Island and the Washington shore of Columbia River, is used for log storage and fishing boats. About 13 feet can be carried through the channel.

Two State fish hatcheries are on **Kalama River** at Mile 63.5 (73.1). **Kalama,** on the E bank about 3 (3.5) miles above Cottonwood Island, is the site of several shingle and plywood mills. A chemical plant on the N side of the town has a 650-foot T-pier with reported depths of 34 feet alongside; the wharf is used for the receipt of chemicals. The Port of Kalama operates a 4½-million-bushel grain elevator 1.5 miles S of the town. The elevator has a 752-foot T-wharf with reported depths of 40 feet alongside and a deck height of 30 feet. The elevator has a 900,000-ton-per-day loading rate. One large ship and one or more barges may load at the same time. Private lights mark each end of the wharf. A marina and mooring basin are at Kalama.

The 500-foot-tall cooling tower of the **Trojan Nuclear Power Plant** is on the S side of the river opposite the mouth of the Kalama River. This tower is conspicuous for many miles both up and down the river.

The channel circling the W side of **Sandy Island** is used by tugs hauling log rafts and barges; the controlling depth is about 7 feet.

Martin Slough, between Martin Island and Burke Island and the Washington shore, is used in log rafting operations, as is **Burke Slough** between Burke Island and the Washington shore.

Columbia City is a municipality at Mile 73 (84) on the Oregon side. The main channel follows along the waterfront.

At the S end of **Deer Island Slough,** about 1.5 miles N of Columbia City, is the pier of a chemical plant. In 1973, a pier extension was planned to allow for accomodation of deep-draft vessels to 35-foot draft.

Saint Helens, at Mile 75 (86) opposite the mouth of Lewis River, is the site of paper and lumber mills, the products of which are occasionally shipped by deep-draft vessel from the mill's wharf. During high water, large vessels require the assistance of tugs to be turned in the narrow basin off the dock. Municipal water is available on the dock in any quantity. The main wharf has a face over 1,300 feet long and a reported depth of 30 feet alongside.

Berths, gasoline, diesel fuel, water, ice, and some marine supplies are available at two floating marine stations at Saint Helens. Outboard engine repairs can be made. There are a large number of houseboats and boathouses in the vicinity of the marine stations.

The stacks of a cement plant and a plywood plant are conspicuous S of Saint Helens along the W side of the N end of Multnomah Channel. A dredged channel with a reported controlling depth of 7 feet in July 1973 leads to a marina in **Scappoose Bay,** SW of Saint Helens. This marina, owned by the Port of Saint Helens, has berths, gasoline, water, and ice available. A marine railway here can handle craft up to 40 feet for hull and engine repairs.

Lewis River enters Columbia River at **Austin Point,** Mile 75.7 (87.0), on the Washington side. Depths are about 3 feet over the mouth, but just below the first bridge a bar reduces the depth to less than 1 foot. Some logging and other traffic move up to **Woodland,** 5.7 miles above the mouth, at high water. The railroad swing bridge 1.8 miles above the mouth remains in the closed position and has a clearance of 28 feet. (See 117.1b and 117.765(a) and (b)(1), chapter 2, for drawbridge regulations.) The other bridges, all fixed, have clearances of 34 feet or more.

From Saint Helens, Columbia River follws a S course to the mouth of the Willamette River, Mile 88 (101.2), and then turns SE to Vancouver, Mile 92 (106).

Multnomah Channel is a 19-mile waterway separated from the Columbia River near Saint Helens and from the Willamette River near Portland by **Sauvie Island.** It is used by tows and small river boats during the winter when the main channel is discharging floe ice; logs are stored along the channel. Depths are 20 feet or more at the entrances, but decrease to 6 feet inside. A power cable about midway through the channel has a clearance of 100 feet. A small-boat landing is 1 mile S from the power cable. Covered berths, with electricity, gasoline, water, ice, a launching ramp, and marine supplies are available. Minor hull and engine repairs can be made. A fixed highway bridge near the S end has a clearance of 78 feet.

Warrior Rock, the point on the E side of **Warrior Point** at the N end of Sauvie Island, is marked by a light. In thick fog vessels seldom attempt to pass the light; they anchor either above or below the point until the weather clears.

Local magnetic disturbance.–Differences of as much as 6° from the normal variation have been reported between Warrior Rock and the light off **Duck Club,** 1.5 miles S.

Lake River, the outlet for **Vancouver Lake,** flows N for 9.5 miles to its junction with Columbia River at the N end of **Bachelor Island,** Mile 76 (88). The reported controlling depth was 6 feet in July 1973 to the small-craft harbor at **Ridgefield,** 2.5 miles above the mouth. There are two marinas at Ridgefield; about 200 berths, gasoline, water, ice, a launching ramp, and some marine supplies are available. Hull and engine repairs can be made. The town of Ridgefield operates a public small-craft moorage just S of the marinas. A wood-treating plant is near the boat harbor.

A marina, in the channel behind the elongated island W of Shillapoo Lake, has berths, with electricity, gasoline, water, ice, a launching ramp, and marine supplies. A 2½-ton hoist is available for launching small craft. Reported depths of 5 feet can be carried through the channel and to the river N of the marina, however, the channel S of the marina is closed by shoals.

Chart 18526.–At Mile 88 (101.2), Columbia River is joined by **Willamette River,** its largest tributary below the Cascade Mountains. The Willamette drains a large territory and is important as the site of the city of Portland, 9 (10.4) miles above its mouth.

The Federal project depth in Willamette River is 40 feet to the Broadway Bridge in Portland, thence, maintained by the Port of Portland, 30 feet between Broadway Bridge and Ross Island. (See Notice to Mariners and latest editions of charts for controlling depths on the Willamette River to the Broadway Bridge.) Additional information can be obtained from the Corps of Engineers, Portland, Oreg. (See appendix for address.) Contact the Port of Portland for the controlling depths of the section of the channel maintained by the port.

(See 162.225, chapter 2, for navigation regulations on Willamette River.)

From the entrance of the Willamette River to the Willamette Falls Locks at Oregon City, overhead clearances and depths are at **Columbia River Datum.** Above the Willamette Falls Locks depths of the Willamette River are at **Willamette River Datum** and clearances are at the datum of **Newburg Pool.**

Kelley Point Junction Light (45°39.2′N., 122°45.7′W.), 21 feet above the water, is shown from a pile structure with a red and green triangular daymark on the end of the dike extending from **Kelley Point** on the E side of the entrance to the river.

Columbia Slough, a narrow back channel roughly parallel to Columbia River, empties into the Willamette about 0.4 (0.5) mile above its mouth. Least depth in the slough is about 2 feet. A dam has been constructed across the slough about 7.3 miles above the mouth.

The fixed bridges over the slough have a least clearance of 27 feet. The least clearance of the overhead power and telephone cables is 42 feet.

In the vicinity of **Post Office Bar Range,** 2 (2.4) miles above the mouth of Willamette River, deep-draft vessels favor the W side of the river, while smaller vessels and tows usually hug the E side because of lesser current. A **312°42′** lighted range marks the river channel near the Burlington Northern Railroad Bridge, about 6 (6.9) miles above the mouth. This range may present a confused image if height of eye is less than 50 feet. Overhead power cables with a least clearance of 230 feet cross the river 0.3 mile above the junction with Multnomah Channel. The twin towers supporting the cables are the most conspicuous features in this area.

Portland, on Willamette River about 9 (10.4) miles from its mouth, is the principal city of the Columbia River system and one of the major ports on the Pacific coast. The port has over 25 deep-draft piers and wharves on both sides of the Willamette River between its junction with the Columbia and Ross Island. In addition there are extensive facilities for small vessels and barges S of Hawthorne Bridge and at North Portland Harbor, S of Hayden Island. It has extensive commerce, both foreign and domestic, and is the port of call for many lines of coastwise, intercoastal, and transpacific steamships. Principal foreign exports are grain, tallow, fish and shellfish, fruits, textile products and apparel, paper, wood pulp, lumber and other forest products, chemicals, fertilizer, and metal ores. The principal imports are fish and shellfish, metal ores, salt, fruit and vegetables, pulp, lumber and other forest products, chemicals, iron and steel, and machinery. The coastwise trade consists mainly of petroleum products, sand and gravel, lumber, chemicals, iron and steel, and cement.

The **Port of Portland,** created by the State in 1891, is controlled by a Port Commission and administered by an executive director. The port operates four marine terminals, Swan Island Ship Repair Yard, and dredges the channel between Broadway and Ross Island Bridges; it also assists the Corps of Engineers with other dredging in the Willamette and Columbia Rivers. The port also operates an international airport and two general aviation airports. A large sternwheel tug and a 30-inch hydraulic pipeline dredge are owned by the port. In addition to dredging the port waterfront and river channel, the port conducts hydrographic surveys periodically along all piers and wharves.

Anchorages.–The anchorages generally used are Vancouver Lower and Upper Anchorages. Vancouver Lower Anchorage is in the Columbia River just SE of the confluence of the Columbia and Willamette Rivers and to the SW of the dredged channel. Vancouver Upper Anchorage is in the Columbia River just NW of the Burlington Northern railroad bridge and to the SW of the Vancouver Lower Turning Basin. Anchorage in the Willamette River at Portland is available in emergencies or inclement weather only. A **special anchorage** in the Columbia River is between Sand Island and Government Island (chart 18531) about 6.5 miles above the railroad bridge. (See 110.1 and 110.128, chapter 2, for limits and regulations.)

Bridges.–The minimum clearance of the drawbridges is 26 feet at the Glisan Street vertical-lift bridge, 10.4 (12.0) miles above the mouth; the raised clearance of both decks of the bridge is 161 feet, and of the lower deck alone, 71 feet up. The minimum fixed-span clearance is 120 feet for the central 100 feet at the Ross Island highway bridge. (See 117.750, chapter 2, for drawbridge regulations and opening signals.) The Marquam fixed highway bridge, midway between the Hawthorne and Ross Island bridges, has a clearance of 120 feet for a center 220-foot width. The river is crossed near the N end of Ross Island by a power cable with clearances of 123 feet over the main channel and 83 feet over the E channel. About 0.4 mile S, over the E channel, are cables with least clearance of 75 feet.

Measured nautical mile.–Two **127°33′-307°33′** measured nautical mile courses are on the Willamette River, the first just SE of Doane Point and the second W of Swan Island.

Tides.–The mean range of tide at Portland is 1.8 feet, and the diurnal range of tide is 2.4 feet.

Weather.–The coast range provides limited shielding from the maritime influence of the Pacific Ocean. The Cascade Range provides a steep high slope for the lift of moisture-laden W winds and consequent heavy rainfall in the Western Cascade Piedmont and also forms a barrier containing the Interior Columbia Basin with its continental airmasses. Airflow is usually NW in Portland in spring and summer and SE in fall and winter, interrupted occasionally by outbreaks of dry continental air E through Cascade passes and across ridge tops. When such an outbreak occurs, extreme high or low temperatures are usually experienced in the Portland area.

Portland has a very definite winter rainfall climate. About 88 percent of the annual total occurs in October through May, 9 percent in June and September, while only 3 percent comes in July and August. Precipitation is mostly rain; on the average only 5 days each year have measurable snow. Snowfall is seldom more than a couple of inches, and it generally lasts only a few days. The greatest measured snowfall in period of record is 15 inches.

Each season is clearly marked. Winter is mild, cloudy, and wet with SE surface winds predominating. Summer is marked by mild temperature, with prevailing NW winds and very little precipitation. Fall and spring are transitional in nature, with frequent periods of ground fog. At all times, incursions of marine-tempered air are a frequent moderating influence. Outbreaks of continental air from E of the Cascade Mountains flow through the Columbia Gorge at near sea level and spread into the Portland area associated with the movement of Pacific storms offshore on a NE storm track. In winter this brings the coldest weather and the extremes of low temperature are registered in the cold airmass. Freezing rain and ice glaze often are transitional effects. In summer the hot, dry, continental air brings the highest temperatures. Extreme temperatures below zero are very infrequent. The absolute lowest ever reached is 3°F below zero. Extreme temperatures above 100°F have occurred several times; the absolute highest temperature is 107°F. Temperatures 90°F or higher are reached every year, but seldom persist for more than 2 or 3 days before the warm spell is broken by a flow of cool, moist air from the ocean.

Destructive storms are infrequent in the Portland area. Surface winds seldom exceed gale force, and only once in the period of record have winds reached higher than 75 m.p.h. Thunderstorms are infrequent. Tornadoes with the funnel cloud reaching the ground have yet to be observed. There are rare occurrences of heavy rain even though winter rains may persist for days at a time.

Ice forms occasionally, but it is seldom heavy enough to affect navigation seriously, although navigation by small craft may be difficult.

(See page T-6 for **Portland climatological table.**)

(See beginning of this chapter for **Pilotage** information.)

Towage.–Dock assist tugs to 2,200 hp are available in Portland. No lighterage is necessary, but occasionally lumber is transferred by barge from lumbermills to vessels.

Portland is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard.–A **Marine Safety Office** is in the Swan Island Industrial Park at Portland. (See appendix for address.)

Harbor regulations.–The regulations are enforced by the Port of **Portland Marine Division;** copies of the regulations may be obtained from the central office at 700 NE Multnomah Street. The Marine Division may be contacted by making the following signals: hoist the International code flag N or sound three short and one long blasts on the whistle until answered.

Wharves.–The Port of Portland operates four modern marine terminals. The largest bulk commodities terminal in the harbor is Municipal Terminal 4, and the largest general cargo terminal in the harbor is Terminal 1. In addition to the port-owned piers and wharves there are many privately owned deepwater facilities and many barge wharves in the harbor. Only the deep-draft facilities are described.

For a complete description of the port facilities refer to Port Series No. 34, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported depths. (For information on the latest depths contact the port authorities or the private operators.) All the Port of Portland operated facilities have rail trackage, water, and electrical shore power connections, as well as many of the privately operated facilities. All wharves have highway connections. Floating and shore-based mobile cranes of up to 75-ton capacity are available, but most general cargo is handled by ship's tackle. Special handling equipment, if available, is mentioned in the description of the particular facility.

Port-operated facilities:

Municipal Terminal 4:

Pier 1 (45°36'18"N., 122°46'31"W.): Berths 401 and 402, W face, 600-foot berthing space; Berths 403, 404, and 405, S side W to E, 1,500-foot total berthing space; 38 feet alongside; deck height, 35 feet; grain elevator with a capacity of over 8 million bushels, grain gallery with six loading spouts and two suction spouts for unloading extends 600 feet along the inshore section of the S side of the wharf, loading rate 1,200 tons per hour; 359,000 square feet covered storage; two 25-ton locomotive cranes with 60-foot booms; molasses, vegetable oil, and tallow pipelines extend from wharf to tank farm; shipment and receipt of general cargo and grain.

Pier 2 (45°36'14"N., 122°46'29"W.): N side, Berths 406, 407, and 408, W to E, 1,500-foot berthing space; 38 feet alongside; deck height, 33 feet; 112,000 square feet covered storage, 260,000 square feet open storage; one 65-ton traveling gantry crane, one 33-ton container crane; vegetable oil and tallow pipelines extend from the wharf to tank farm; shipment and receipt of general cargo, containerized cargo, receipt of tallow, molasses, and liquid fertilizer.

Pier 4 (45°36'06"N., 122°46'26"W.) Berths 410 and 411, W to E, 1,140-foot total berthing space; 40 feet alongside; deck height, 33 feet; 34,000 square feet covered storage, 359,000 square feet open storage; three 36-ton traveling gantry cranes; shipment and receipt of general and dry bulk cargo.

Pier 5 (45°36'01"N., 122°46'23"W.): Berth 412, 900-foot berthing space; 36 feet alongside; deck height, 33 feet; 113,000 square feet open storage; bulk out-loader, rate 300 tons per hour; shipment and receipt of dry bulk cargo.

Steel Handling Wharf (45°35'50"N., 122°46'23"W.): Berths 414 and 415, 944 feet long, 1,180-foot berthing space with dolphins; 42 feet alongside; deck height, 25 feet; two 65-ton gantry cranes; 26,000 square feet covered storage; 27 acres open storage; receipt of steel products.

Auto Discharge Berths: Berth 416, 0.7 mile NW of St. Johns Bridge; 414 feet long, 830-foot berthing space; 40 feet alongside; deck height, 14 feet; Berth 417, 0.5 mile NW of St. Johns Bridge; 414 feet long; 830-foot berthing space; 40 feet alongside; deck height, 14 feet; 40 acres of open, paved auto storage area; both berths are equipped for off-loading through vessel sideports.

Municipal Terminal 2:

Berths 201, 202, 203 (45°32'56"N., 122°42'06"W.): NW side, Berth 201, 600-foot berthing space; 30 feet alongside; N side, Berth 202, 585-foot berthing space; 26 feet alongside; SE side, Berth 203, 600-foot berthing space; 31 feet alongside; all deck heights, 30 feet; 178,000 square feet covered storage, 493,000 square feet open storage, 19,000 square feet cold storage; elevator at Berth 202 can handle 10 tons at 25 feet per minute; shipment and receipt of general cargo.

Berths 205, 206 (45°32'51"N., 122°41'49"W.): 1,342-foot total berthing space; 33 to 40 feet alongside; deck height, 26 feet; one 60-ton, one 50-ton, and one 40-ton mobile gantry cranes; 90,000 square feet covered storage, 900,000 square feet open storage; shipment and receipt of general cargo.

Municipal Terminal 1:

Berths 101, 102, 103 (45°32'34"N., 122°41'26"W.): NW end of wharf, Berths 101 and 102, 1,100-foot berthing space; 32 to 38 feet alongside; Berth 103, adjacent to and S of Berth 102, 590-foot berthing space; 27 to 32 feet alongside; deck heights, 29 feet; 343,000 square feet covered storage.

Berth 104 (45°32'25"N., 122°41'15"W.): 310-foot berthing space with dolphins; 13–16 feet alongside; deck height, 20 feet.

Berths 105, 106: immediately SE of Berth 104; 1,170-foot berthing space; 35 feet alongside; deck height, 33 feet; 267,000 square feet covered storage, 4.5 acres open storage; one 150-ton shear-leg crane serves Berth 106; shipment and receipt of general cargo.

Municipal Terminal 6:

Berths 603, 604, 605 (45°38'24"N., 122°44'45"W.): 2,850 feet of berthing space; 40 feet alongside; deck height, 20 feet; five container cranes; 53 acres paved open storage; receipt and shipment of general cargo.

Private facilities:

Time Oil Wharf (45°36'55"N., 122°47'07"W.): T-wharf, 870-foot berthing space with dolphins; 34 feet alongside; deck height, 26 feet; petroleum products received by tanker, shipped by barge, bunkering vessels; owned and operated by Time Oil Co.

Linnton Wood Chip Berth (45°36'44"N., 122°47'22"W.): 1,200-foot berthing space with dolphins; 35 feet alongside; chips loaded by pneumatic loader, loading rate 1,200 tons per hour; owned and operated by Georgia-Pacific Corp.

Medford Corp. Wharf (45°36'29"N., 122°47'12"W.): 785-foot berthing space; 40 feet alongside; deck height, 30 feet; this wharf is now used as a lay berth; owned by Medford Corp.

Phillips Petroleum Wharf (45°36'16"N., 122°47'05"W.): 650-foot berthing space with dolphins; 32 feet alongside; deck height, 28 feet; shipment and receipt of petroleum products, bunkering vessels; owned and operated by Phillips Petroleum Co.

Atlantic Richfield Oil Wharf (45°35'41"N., 122°46'37"W.): 600-foot berthing space with dolphins; 35 feet alongside; deck height, 32 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by Atlantic Richfield Co.

Mobil Oil Wharf: joins Atlantic Richfield Wharf to the SE; 590-foot berthing space with dolphins; 30 feet alongside; deck height, 30 feet; shipment and receipt of petroleum products, bunkering vessels; owned and operated by Mobil Oil Co.

Northwest Natural Gas Company Wharf (45°34'51"N., 122°45'29"W.): 750-foot berthing space; 26 feet alongside; deck height, 26 feet; receipt of coal tar by tanker and creosote by barge, shipment of creosote by barge; operated by Koppers Co., Inc., Northwest Natural Gas Co., and Knappton Towboat Co.

McCormick & Baxter Creosote Wharf (45°34'38"N., 122°44'32"W.): 910-foot berthing space with dolphins; 36 feet alongside; deck height, 18 feet; receipt of creosote by tanker and chemicals by barge; owned and operated by McCormick and Baxter Creosoting Co.

Pennwalt Chemical, Oil and Salt Wharves (45°34'17"N., 122°44'26"W.): 1,445-foot berthing space; 35 feet alongside; deck height, 30 feet; hopper and conveyor belt carry salt from wharf to chemical plant in rear; receipt of bulk salt by self-unloading vessels, receipt of fuel oil for plant consumption, shipment of chlorine and caustic soda; owned and operated by Pennwalt Chemical Co.

Shell Oil Pier (45°34'03"N., 122°44'16"W.): 504-foot berthing space each side; 24 feet alongside; deck height, 32 feet; shipment and receipt of petroleum products, bunkering vessels, fueling small craft; owned and operated by Shell Oil Co.

Standard Oil Pier (45°34'01"N., 122°44'13"W.): 656-foot berthing space each side; 36 feet alongside; deck height, 32 feet; shipment and receipt of petroleum products, bunkering vessels, fueling small craft; owned and operated by Standard Oil Co, of California.

Union Oil Pier (45°34'00"N., 122°44'08"W.): 576-foot berthing space; 32 to 38 feet alongside; deck height, 32 feet; shipment and receipt of petroleum products, bunkering vessels, fueling small craft; owned and operated by Union Oil Co. California.

Texaco Oil Wharf (45°33'25"N., 122°43'13"W.): 670-foot berthing space with dolphins; 31 feet alongside; deck height, 29 feet; shipment and receipt of petroleum products; owned and operated by Texaco, Inc.

General Ore Dock (45°33'04"N., 122°41'37"W.): floating barge and line of mooring dolphins provide 700-foot berthing space; 35 feet alongside; pneumatic unloading tower on barge, unloading rate 140 tons per hour; receipt of alumina; owned and operated by General Ore Inc.

Permanente Wharf (45°32'13"N., 122°40'34"W.): 400-foot berthing space with dolphins; 34 feet alongside; deck height, 30 feet; two cement receiving pipelines extend from wharf to storage silos in rear, capacity 160,000 barrels; each pipeline can handle 1,200 barrels per hour; receipt of bulk cement; owned and operated by Kaiser Cement and Gypsum Corp.

Portland Grain Wharves (45°32'08"N., 122°40'28"W.): 640-foot berthing space with dolphins; 35 feet alongside; deck height, 30 feet; 935,000-bushel grain elevator with five loading spouts, combined loading rate 24,900 bushels per hour; marine leg with unloading rate of 9,900 bushels per hour; receipt and shipment of grain; owned and operated by Bunge Corp.

Centennial Mills Wharf (45°32'04"N., 122°40'44"W.): 690-foot berthing space; 35 feet alongside; deck height, 33 feet; shipment of flour; owned and operated by Centennial Mills, Inc.

Louis Dreyfus Wharves (45°31'45"N., 122°40'04"W.): 586-foot berthing space; 30 to 42 feet alongside; deck height, 31 feet; 2-million-bushel grain elevator; gallery has six loading spouts and one marine leg; combined loading rate 50,000 bushels per hour, combined unloading rate 33,000 bushels per hour; receipt and shipment of grain; owned and operated by Louis Dreyfus Corp.

Supplies.–Marine supplies of all kinds are available in Portland. Bunker fuel, diesel oil, and lubricants are available. Most large vessels are bunkered at their berths by barge. Water is available at most of the berths.

Repairs.–Portland is a major ship repair center on the Pacific coast. Portland Ship Repair Yard, on Swan Island on the E side of Willamette River, is the major repair facility at the Port of Portland. The yard is operated by the port and used by private marine contractors on a tariff basis. There are four floating drydocks here, including the largest on the Pacific coast. This floating drydock has an overall length of 982 feet, length of 902 feet over the keel blocks, clear width of 185 feet, a depth of 35 feet over the keel blocks, and a lifting capacity of 81,000 tons; a 20-ton whirley crane is mounted on a wingwall. Complete repair facilities and services are available at the yard, including steam, compressed air, AC and DC power, and fourteen whirley cranes from 45 to 120 tons, running on two separate craneways. The yard has 6,000 feet of ship repair berths and 3,000 feet of layup berths for idle vessels. There is a 120,000-barrel ballast treatment plant for the offloading of oily slops.

There are several private repair firms elsewhere in the harbor. These firms have ways and repair facilities for smaller craft, including a repair yard on the E bank of the Willamette River just N of the St. Johns Bridge which has several marine ways, the largest of which can handle craft up to 170 feet for complete hull, engine, or electronic repairs.

One well-equipped firm specializes in marine salvage in Portland. It has a 203-foot 3,600-hp converted LSM, equipped with 50-ton winches. Several firms undertake minor salvage work.

Communications.–Portland is served by Interstate Highways 5 and 80N, by U.S. Highways 30 and 26, and by several State highways. Four major railroads and several airlines handle both passengers and freight. Portland International Airport is about 2 miles N of the city. Many barge lines provide service up the Columbia River to Richland, Wash., 214 (246) miles from Portland; barge service is also available on the Willamette River to Salem, Oreg., 73.6 (84.7) miles above the mouth, and on the Snake River to Lewiston, Idaho, 324 (373) miles from Portland.

Small-craft facilities.–Most of the small-craft facilities, including practically all of the moorage, is in North Portland Harbor and along the S bank of the Columbia River between the E end of Tomahawk Island and the W end of Government Island. Complete facilities are available. Berths, electricity, gasoline, diesel fuel, water, ice, and marine supplies can be obtained at many marinas. Hull, engine, and electronic repairs can be made. Drydocks to 70 tons, 55 feet long, and 16 feet wide are available in North Portland Harbor.

Chart 18528.–Navigation of Willamette River above Portland is hazardous due to the rocks, shoaling bars, and strong currents. Local knowledge and midchannel courses are recommended. Depths of about 6 feet can be carried to Oregon City, 22.6 (26.0) miles above the mouth, thence about 2 feet to Corvallis, 115 (132) miles above the mouth. Present chart coverage extends only to Newberg, 43.4 (50) miles above the mouth. Many of the daybeacons in the Willamette River are seasonal. The navigational aids above Newberg are not maintained. Navigation should be with local knowledge only. The Portland Coast Guard should be contacted for the latest information concerning navigation of Willamette River above Salem.

Below the falls at Oregon City, ordinary fluctuation of stage of water is 15 feet and extreme fluctuation due to flood conditions is 30 to 50 feet. Above Oregon City, ordinary fluctuation is 12 to 20 feet and extreme is 20 to 27 feet.

Depths and clearances of bridges and cables are at **Columbia River Datum** below the Willamette Falls Locks. Above the Willamette Falls Locks depths of the Willamette River are at **Willamette River Datum** and clearances are at the datum of **Newberg Pool.**

The minimum clearances of the overhead power cables crossing the river from Portland to Newberg are: 77 feet to Willamette Falls Canal; 72 feet over Willamette Falls Canal; and 75 feet to Newberg.

Between Portland and Willamette Falls most of the terminals are privately owned mill wharves and oil-receiving facilities. Above the falls are small privately owned wharves or natural landings.

Sellwood fixed highway bridge, 14.5 (16.7) miles about the mouth, has a clearance of 72 feet. A marina, on the W bank of the river just N of the bridge, can provide berths, gasoline, and marine supplies. Craft up to 36 feet can be handled for hull, engine, or electronic repairs. Another marina, on the E bank of the river just S of the bridge, can provide berths, gasoline, and marine supplies. A marina at **Milwaukie,** 16.2 (18.6) miles above the mouth, has a launching ramp. Minor engine repairs can be made.

A fixed railroad bridge, 17.4 (20) miles above the mouth, has a clearance of 74 feet.

The Crown Zellerbach Co. wharf, on the W bank of the river 0.3 (0.3) miles above the railroad bridge, is about 840 feet long with reported depths of 30 feet or more alongside; each end of the offshore wharf is marked by a privately maintained light. A loading tower and conveyor system on the wharf loads wood chips on barges.

The channel passes E of **Hog (Rocky) Island,** 1.6 (1.8) miles above the railroad bridge. **Copeleys Rock,** 150 yards E of the S end of the island, is covered 10 feet and should be avoided.

Oregon City, on the E bank 22.6 (26) miles above the mouth, is connected with **West Linn** by two fixed highway bridges; one, about 0.2 (0.2) mile below the Willamette Falls canal locks, has a vertical clearance of 74 feet. The second, 0.6 (0.7) miles below the N end of the locks, has a clearance of 76 feet.

A marina, on the E bank just above the lower highway bridge, has about 350 berths, gasoline, diesel fuel, a launching ramp, and marine supplies. Outboard engine repairs can be made.

A large papermill is on each bank of the river at Willamette Falls Canal.

Willamette Falls Canal, on the W bank 22.8 (26.2) miles above the mouth, has four locks with a total lift of 50 feet; usable lock dimensions are 175 feet long, 37 feet wide, and 6 feet deep over the miter sills at low water. The least clearance of the power cables and pipeline that cross the canal is 72 feet. (See 207.680, chapter 2, for regulations concerning administration and navigation of the canal and locks.) Upbound vessels may expect a delay at the approach to the locks and through the locks during weekdays because of the downbound traffic from the papermills. The lock is equipped with a radiotelephone. The lockmaster can be contacted on VHF-FM channel 14 (156.70 MHz); call sign, WUJ–363.

A warehouse and other buildings of a papermill are on the W bank alongside the canal locks. An 850-foot timber wharf is on the E side of the canal.

A marina, on the E bank opposite **Willamette** and 24.3 (27.9) miles above the mouth, has about 50 berths, with electricity, gasoline, diesel fuel, and water available. This marina has an elevator lift that can handle craft to 5 tons or 30 feet for hull and engine repairs.

From the entrance to **Tualatin River,** 24.8 (28.5) miles above the mouth, for over 4 miles, Willamette River is shallow and winding; buoys and unlighted ranges mark the channel.

Small craft can tie up at **Shanks Landing,** 28.8 (33.1) miles above the mouth.

Walnut Eddy is on the E bank 29.4 (33.8) miles above the mouth.

Cable ferry.–The Canby ferry crosses the river about 1.1 (1.3) miles above Walnut Eddy. The ferry carries passengers and vehicles, and operates from 0600 to 2200 daily except during periods of high water. When the ferry is underway, the cable is suspended below the water surface at varying depths. When the ferry is docked, the cable is dropped to the bottom. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.** Near **Wilsonville,** 33.7 (38.8) miles above the mouth, there are twin fixed highway bridges and a fixed railroad bridge, with clearances of 74 feet and 76 feet, respectively. A marina, on the S bank under the railroad bridge, has about 115 berths, with electricity, gasoline, water, ice, and marine supplies. The marina has a launching ramp and can make hull and engine repairs. Marine towing service for small craft is also available at this marina.

A quarry is on the N side of the river about 300 yards W of the railroad bridge. Mariners are advised to exercise caution because barges and tugs may be operating in the area.

Near **Butteville,** 37.3 (43.0) miles above the mouth, there is a small-craft marina with about 35 berths, electricity, gasoline, water, ice, a launching ramp, and some marine supplies available. Minor engine repairs can be made. The fixed highway bridge, 42.1 (48.4) miles above the mouth, has a clearance of 68 feet at the main span. At **Newberg,** 43.4 (50.0) miles above the mouth, there is a fixed highway bridge with a clearance of 88 feet. An overhead power cable with a clearance of 55 feet, crosses the river 44.9 (51.7) miles above the mouth.

From Newberg to Corvallis, Willamette River is more tortuous and turning, but not considered difficult for the small craft and occasional log-rafting tugs that use this section. The tributary **Yamhill River** empties into Willamette River about 3 miles above Newberg. Depths in Yamhill River of about 3 feet are reported to Dayton, 4 miles above its mouth.

Cable ferry.–The Wheatland ferry crosses Willamette River about 63 (72.5) miles above the mouth. The ferry carries passengers and vehicles, and operates between 0600 and 2145 daily except when the river level exceeds 16 feet. Warning signs and warning lights mark the crossing. The ferry is guided by two cables. The upper cable, 80 feet above the river level, controls the ferry during normal conditions. The low water cable, near the bottom at all times, controls the ferry when the river level drops below 12 feet. The low water cable is dropped to the bottom when the ferry is not operating. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Salem, capital of the State of Oregon, is 74.4 (85.6) miles above the mouth. Several moorings and floats for log-rafts and small craft are here; berths, gasoline, diesel fuel, water, ice, and marine supplies are available at several small marinas. Hull engine, and electronic repairs can be made in Salem.

A power cable at the N city limits of Salem has a clearance of 86 feet. Minimum clearance of the bridges is 69 feet at the fixed highway bridges, and 42 feet down and 87 feet up at the railroad lift bridge. The railroad lift bridge is maintained in the closed position. (See 117.755(a), chapter 2, for bridge regulations.)

At **Independence,** 83 (95.5) miles above the mouth, there is a small-craft launching ramp, but no facilities.

The town of **Buena Vista** is 92 (106) miles above the mouth of the river.

Cable ferry.–A cable ferry crosses the river near Buena Vista. The self-propelled ferry carries passengers and vehicles, and operates from 0700 to 2100 daily except Saturdays, Sundays, and holidays. Both when the ferry is underway and when docked the guide cables are suspended approximately 80 feet above the water. When underway, the ferry shows the required navigation lights. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

The river is crossed at **Albany,** 104 (119.8) miles above the mouth, by three bridges: a railroad swing bridge with a clearance of 40 feet, a fixed highway bridge with a clearance of 55 feet, and a fixed highway bridge with a clearance of 60 feet in the center of the N span and 58 feet in the center of the S span. The railroad swing bridge is maintained in the closed position. (See 117.1b and 117.759b (a) through (d), and (f) (6), chapter 2, for drawbridge regulations and opening signals.)

Corvallis, 114.6 (131.9) miles above the mouth, is the limit of the Federal project of the river. Navigation above Corvallis is dangerous and should not be attempted.

There are small-craft finger piers and marginal facilities at Corvallis; gasoline and water are available. A highway bridge has a swing span with a clearance of 35 feet. (See 117.1b and 117.759b (a) through (d) and (f)(7), chapter 2, for drawbridge regulations and opening signals.)

Chart 18526.–The main channel of the Columbia River favors the Washington shore, N of **Hayden Island** and **Tomahawk Island,** from **Mathews Point** to Ryan Point. Overhead clearances are at **Columbia River Datum.** Overhead power cables with a least clearance of 220 feet cross at Mile 90.6 (104.2). Two bridges cross the main channel between Vancouver and Hayden Island. The railroad swing bridge at Mile 91.8 (105.7) has a clearance of 39 feet. The Interstate 5 highway bridge, Mile 92.5 (106.5) has twin lift spans with clearances of 39 feet down and 178 feet up, and twin fixed spans with a clearance of 58 feet at the center and 46 feet elsewhere crossing the alternate barge channel S of the main channel. (See 117.750, chapter 2, for drawbridge regulations and opening signals.)

North Portland Harbor is that portion of the river channel between the Oregon shore and Hayden Island. The lower or W entrance is at Mile 89.0 (102.5); the upper or E entrance is at Mile 94.5 (108.8).

A Federal project provides for a 40-foot turning basin at the W entrance to North Portland Harbor, a 40-foot channel for about 1.3 miles above the W entrance, and thence a 20-foot channel to the project limit about 2 miles farther upstream. In June 1981, the midchannel controlling depth was 40 feet for about 1.3 miles above the W entrance; thence in 1977-1978, the controlling depth was 7 feet to the end of the project. The Federal project for the E entrance to North Portland Harbor provides for a channel 10 feet deep from the main channel in Columbia River SW to just S of the E end of Tomahawk Island. In December 1980, the midchannel controlling depth was 8 feet from the junction with Columbia River to just off the channel range front light, thence 2 feet (10 feet in the S quarter) to the project limit. A **241°** lighted range marks the channel for about 0.6 mile from the junction with Columbia River. Two bridges cross North Portland Harbor. The railroad bridge, 2.6 miles E of the W entrance, has a swing span with a clearance of 39 feet. (See 117.1b and 117.759b (a) through (d) and (f)(5), chapter 2, for drawbridge regulations and opening signals.) A fixed highway bridge (Interstate 5) about 0.8 mile E has a clearance of 34 feet. A large marina is on the S side of Hayden Island just E of the Interstate highway bridge. Berths, gasoline, diesel fuel, water, ice, and marine supplies are available. Hull, engine, and electronic repairs can be made. A large repair facility, just W of this marina, has a 70-ton drydock that can handle craft up to 55 feet long and 16 feet wide for hull, engine, and electronic repairs. A private yacht club is near the E end of Tomahawk Island. Many houseboats are moored in North Portland Harbor.

Vancouver is on the Washington side of the Columbia River at Mile 92 (106). The port is a water outlet for a large lumber-producing section in SW Washington, as well as a distributing point for a fair share of the grain produced in the interior of Washington and Oregon. Bulk bauxite, paper, petroleum products, fertilizer, and general merchandise are also shipped. Steel, wood products, chemicals, and automobiles are the major imported items at Vancouver.

The Port of Vancouver is controlled by a board of commissioners and a general manager.

Anchorages.–Anchorages for Vancouver are the same as those used for Portland. (Refer to that section under the discussion of the Port of Portland.)

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Wharves.–The Port of Vancouver owns and operates one deep-draft terminal; a grain terminal and oil wharf, owned by the port, is leased to private companies. There are several private facilities which, with two exceptions, handle barge traffic only. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 33, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported; for information on the latest depths contact the port authorities or the private operators. Water and electrical shore power connections are available at most of the wharves. All the facilities described have direct highway connections and plant trackage with direct railroad connections. Cranes to 50-ton capacity are available at the port facilities. Special handling equipment, if available, is mentioned in the description of the particular facility.

Port-operated facilities:

Port of Vancouver Terminal 2 (45°37′58″N., 122°41′52″W.): 2,035-foot berthing space with dolphins; 40 feet alongside; deck height, 30 feet; 166,000 square feet covered storage, 2 acres paved open storage; three 50-ton traveling gantry cranes; shipment and receipt of general and dry bulk cargo.

Privately operated facilities:

McGuire Terminal Dock (45°38′06″N., 122°42′06″W.): 470-foot berthing space with dolphins; 35 feet alongside; deck height, 30 feet; receipt and shipment of petroleum products; owned by Port of Vancouver, operated by GATX Corp.

Alcoa Alumina Wharf (45°38′45″N., 122°43′58″W.): 440-foot berthing space with dolphins; 40 feet alongside; deck height, 30 feet; alumina is unloaded at this wharf with a clamshell bucket at a rate of 1,000 tons per hour and transferred to storage tanks by a 48-inch conveyor belt; owned and operated by Alcoa.

Vancouver Grain Elevator Wharf (45°37′47″N., 122°41′31″W.): 965-foot berthing space; 40 feet alongside; deck height, 34½ feet; grain elevator with a capacity of 4½ million bushels; grain gallery with seven loading spouts has a combined loading rate of 40,000 bushels per hour; one marine leg used for unloading barges and deep-draft vessels, unloading rate of 18,000 bushels per hour; shipment and receipt of grain; owned by the Port of Vancouver, operated by United Grain Corp.

Ideal Cement Pier (45°37′33″N., 122°41′06″W.): 650-foot berthing space with dolphins; 35 feet alongside; deck height, 22 feet; cement pipelines extend from wharf to storage silos, capacity 100,000 barrels, and to the plant in rear; pumps ashore load vessels, shipboard pumps unload through the pipelines; receipt and shipment of bulk cement; owned and operated by Ideal Cement Co. Berthing space at this pier is leased by the Fletcher Oil Co. for the receipt of petroleum products by deep-draft vessel.

Supplies.–Complete marine supplies and services are available from Portland. Fuel oil must be delivered by barge. Small-craft supplies are available in North Portland Harbor and at other places on the Columbia River E of Vancouver.

Repairs.–Complete repairs for large and small vessels are available at Portland. Vancouver has no facilities for repair work on large oceangoing vessels. Small-craft repairs on craft up to 70 tons or 55 feet can be made in North Portland Harbor; there are no repair facilities on the N side of the river at Vancouver.

(See North Portland Harbor for information on **small-craft facilities** in the vicinity of Vancouver.)

Communications.–Vancouver is served by Interstate Highway 5 and by several State routes. Three major railroads have connections to the city. Portland International Airport is on the S side of the river about 3.5 miles ESE of Vancouver.

Chart 18531.–From Vancouver to Bonneville, Mile 126 (145), Columbia River passes through the impressive **Columbia River Gorge,** flanked on each side by railroads and highways. Commerce on the river in this section consists mostly of pleasure craft and barges.

There are more than 35 dike dolphins along this portion, some are marked with lights at their ends. All the dikes are completely covered at higher stages, but bare about 6 feet at datum level.

Ryan Point, 1.4 miles ESE of the Interstate 5 highway bridge, is the site of a former shipyard and is now an industrial park. A public launching ramp is at the park.

There are many marinas, yacht clubs, and moored houseboats along the Oregon shore from Tomahawk Island to the E end of Government Island. Berths, gasoline, diesel fuel, water, ice, and marine supplies are available at several of these facilities.

A 107°-287° measured nautical mile has been established at **Lieser Point,** 3.6 (4.1) miles above the Interstate 5 highway bridge at Vancouver. Each range marker is painted yellow with black stripes.

In October 1977, twin fixed highway bridges with a minimum clearance of 136 feet over the channel were under construction at Mile 97.9 (112.7).

A **special anchorage** is between Sand Island and Government Island. (See 110.1 and 110.128, chapter 2, for limits and regulations.)

Camas, at Mile 104.3 (120.0) on the Washington side, has a large papermill which maintains its own wharf on **Camas Slough,** N of **Lady Island.** About 8 feet can be taken from the Columbia River through the W entrance to the papermill wharf near the E end of the slough; the channel is marked by lights, a buoy, and a lighted range. The E entrance to the slough is foul and bares at low water. Most of the traffic in the slough is for the papermill, which barges its products to Portland for reshipment. At high flood stages a current of as much as 5 knots prevails in the slough.

Two fixed highway bridges cross Camas Slough from the mainland to Lady Island; the W one has a clearance of 69 feet, and the E one has a clearance of 37 feet.

A marina at mile 105.7 (121.6) just E of Camas, has about 250 berths, open and covered and with electricity, gasoline, water, a launching ramp, and complete marine supplies. A marine sales and repair facility adjacent to the marina has a 12-ton hoist that can handle craft to 42 feet for hull and engine repairs. A sawmill is just E of the marina.

There are five power cables crossing at **Ione Reef,** S of Lady Island. The least clearance is 133 feet.

The entrance to **Sandy River,** on the Oregon side opposite Camas, bares at low water. At higher flood stages, passage up Sandy River as far as **Troutdale** is possible.

Local magnetic disturbance.–Differences of as much as 8° from the normal variation have been observed between **Tunnel Point** and **Point Vancouver,** E of **Reed Island,**

Dangers.–In this section of the river, the principal hazards to navigation are the strong currents, rocks and rocky banks, winds, and an accumulation of ice.

Currents.–In general, currents run fair with the main channels with considerable intensity, increasing in regions upstream toward Bonneville. Exceptions are the turn in the channel at Washougal Light 50, where a NW set prevails; SW of **Cape Horn,** where a W set is experienced; and the region between Fashion Reef and Multnomah Falls, where a S set is experienced.

Weather.–Between **Corbett,** Mile 110.3 (127), and The Dalles, Mile 165 (189.8), the river flows between the bold mountains of the **Cascade Range.** In this stretch, winds of considerable force prevail during much of the time; generally they blow upstream in summer and downstream in winter. Daily peak velocities vary from 6 to 42 knots, but Corps of Engineers officials at Bonneville Dam measured gusts as high as 76 knots during 1960-62.

Near **Warrendale,** Mile 123 (141.5), the river becomes very constricted within less than a mile and continues so almost to the approach to the locks of Bonneville Dam, at the lower end of **Bradford Island.**

Beacon Rock, 840 feet high and 300 yards inshore, is on the Washington side opposite Warrendale. It is a prominent dark gray rock outcropping of volcanic origin. A State park of the same name surrounds the rock. The park maintains a mooring float just inside the entrance to the channel W of **Pierce Island;** moorage is restricted to pleasure boats and to periods not to exceed 36 hours. Water and ice are available at the park.

Bonneville, on the Oregon side at Mile 126 (145), is the headquarters of the U.S. Army Corps of Engineers in charge of the Bonneville Lock and Dam.

Bonneville Lock and Dam, 126.3 (145.3) miles above the mouth of the Columbia River, is in two parts. The spillway is between the Washington shore and Bradford Island. The powerhouse and lock are between Bradford Island and the Oregon shore. The dam has a single lift ship lock with a vertical lift of about 59 feet. Restricted areas are above and below the spillway and powerhouse. (See 207.718 (a) through (v) and (w)(1), chapter 2, for information concerning use, administration, and navigation of Bonneville Lock and Dam.)

The strong current toward the powerhouse makes it difficult to approach Bonneville Lock from upstream, particularly if the lock is approached at an angle and if a turn is to be executed in time to avoid an accident. Therefore, all craft approaching the lock from the E and pushing one or more barges should steer as close to the Oregon mainland shore as safety will permit, should be in line with the lock upon reaching the E end of the guide wall, and should continue at a steady but reduced speed if the lock is prepared for entrance and the signal for entrance has been given.

From Bonneville to The Dalles, the channel is through the pool created by Bonneville Dam, which extends 40 (46) miles to The Dalles Dam. Depths and overhead clearances are at **normal pool level.**

Although there is deep water in much of the pool, the controlling depth to The Dalles Dam navigation lock is about 20 feet. The channels are marked by aids to navigation.

An overhead power cable with a clearance of 190 feet crosses the river 1 (1.1) mile above the dam.

Tugs use the dolphins on the S side of the river 1.2 (1.5) miles above the lock for mooring and shifting barges and log rafts. Small craft can find refuge in the mouth of **Eagle Creek,** 0.6 (0.7) miles above the lock, if the creek is not in flood.

Currents.-From the lock at Bonneville through Cascade Rapids, constant piloting is necessary because of the strong currents. From Cascade Rapids E, a set of 1° to 3° may be experienced depending on the angle that the course makes with the general direction of the river, the strength of the current, and the direction and strength of the wind.

Local magnetic disturbance.-Differences of as much as 6° from normal variation have been observed along this section of Columbia River.

Bridge of the Gods, 2.6 (2.8) miles above the Bonneville Dam, has a fixed span with a clearance of 135 feet over a middle width of 284 feet.

Cascade Locks, 3 (3.3) miles above the Bonneville Dam, have been drowned out. At normal stages of pool level the sides of the old chamber of the lock bare about 3 feet. A strong current flows through the lock. A marina, just E of the lock, has berths, gasoline, and a launching ramp.

Along this section are several inlets or rivers, generally used for log storage, where small craft may find refuge. Most are behind fixed bridges. These places, and their distances above the Bonneville Dam are:

Rock Creek at **Stevenson,** Wash., 4.2 (4.8) miles; the bridge clearance is 18 feet. **Government Cove,** on the Oregon side, 5.6 (6.4) miles. **Wind River** at **Home Valley,** Wash., 8.1 (9.3) miles; the minimum bridge clearance is 26 feet. **Drano Lake,** near **Cook,** Wash., 14.5 (16.7) miles; the bridge clearance is 19 feet. **Ruthton,** Oreg., 17.8 (20.4) miles. **White Salmon River** at **Underwood,** Wash., 20.9 (24) miles; the bridge clearance is 26 feet.

Rock Creek, Wind River, and Drano Lake have log rafts and booms used by nearby sawmills.

Hood River, Oreg., 21.7 (25) miles above the Bonneville Dam, is a town at the junction of Columbia and Hood Rivers. There are two boat basins at Hood River; the W basin is privately owned and is used by a repair yard for building and repairing steel barges and tugs. The E basin, operated by the Port of Hood River Commission, has about 55 berths. Gasoline and water are available. The entrance to the W basin is marked by a light, and the entrance to the E basin is marked by private lights. In 1976, depths of 7 to 12 feet were reported available in the E basin. A shoal, covered 2 feet, is reported to extend NW from the W side of the E basin entrance to near the entrance to Hood River.

The highway bridge over Columbia River just above the small-craft basin has a lift span with a clearance of 67 feet down and 148 feet up. (See 117.1b and 117.759b(a) through (d) and (f)(8), chapter 2, for drawbridge regulations and opening signals.)

There are power cables with clearance of 155 feet over the river at **Stanley Rock,** 22.9 (26.4) miles above Bonneville Dam, and at **Crates Point,** 13 (15) miles above Stanley Rock.

At **Bingen,** on the Washington side 23 (26.4) miles above the Bonneville Dam, there are two barge basins with adjacent sawmills. A light and a daybeacon mark the entrance to the E basin, which has a launching ramp and about 20 berths for small craft. In 1976, the controlling depth was 7 feet at midchannel in the entrance to the E basin with 5 to 10 feet in the basin, except for shoaling along the edges. The entrance to the W basin is unmarked; reported depths of 10 feet are in this basin.

The Dalles is on the Oregon side of Columbia River, 39 (44.8) miles above the Bonneville Dam. River traffic, between the town and Vancouver, consists mainly of petroleum products and general freight bound upstream, and wheat, wool, and rafted logs bound downstream.

A small-boat mooring basin with a breakwater and sheer boom protection is just E of the city wharf. Deeps inside are 4 to 8 feet. The basin has a small-craft launching ramp. Gasoline, ice, and marine supplies are available. Engine repairs can be made.

The city wharf is over 1,000 feet long and has two warehouses; depths alongside are about 20 feet. There are also private facilities for handling petroleum products, bulk grain, and fresh fruit. An aluminum mill is at West The Dalles.

Charts 18533, 18535.-The Dalles Lock and Dam, 40 (46) miles above Bonneville Dam, has a single lift lock with a vertical lift of about 87.5 feet. **Restricted areas** are above and below the dam. (See 207.718 (a) through (v) and (w)(2), chapter 2, for information concerning use, administration, and navigation of The Dalles Lock and Dam.) **Lake Celilo,** the pool created by The Dalles Dam, provides slack water navigation with a controlling depth of about 14 feet for 22 (25.3) miles upstream to the John Day Dam. Depths and overhead clearances are at **normal pool level.**

Traffic above The Dalles Dam consists mostly of grain and petroleum products.

Ice occasionally interferes with navigation for 2 weeks or more, usually in January or February.

A fixed highway bridge across the downstream approach to the lock at The Dalles Dam has a clearance of 100 feet.

A railroad bridge, 7 (8.1) miles above The Dalles Dam, has a lift span with clearance of 20 feet down and 79 feet up. (See 117.1b and 117.759a, chapter 2, for drawbridge regulations and opening signals.)

The Celilo Park basin 7.7 (8.9) miles above The Dalles Dam, offers shelter to small boats, but there are no facilities except a launching ramp. The entrance to the basin is marked by a light.

At **Miller Island,** 10.5 (12) miles above The Dalles Dam, the N and S channels are marked by ranges. The main channel is along the N side of the island; however it is reported that the S channel is more frequently used.

On the Oregon side just S of Miller Island is **Deschutes River,** crossed by a fixed bridge with clearance of 20 feet. Small craft occasionally seek shelter here during unfavorable weather.

A grain elevator with a barge loading chute extending to the river is at **Biggs,** Oreg.

The **Biggs Bridge,** 13.6 (17) miles above The Dalles Dam, has a clearance of 88 feet at the center of the fixed highway span. The bridge joins **Maryhill,** Wash., and **Biggs Junction,** Oreg.

Charts 18535, 18536, 18537, 18539.-John Day Dam, 188 (216.3) miles above the mouth of the Columbia and 21 miles above The Dalles Dam, has a single lift lock with a vertical lift of about 105 feet. **Restricted areas** are above and below the dam. (See 207.718 (a) through (v) and (w)(3), chapter 2, for information concerning use, administration, and navigation of John Day Dam.) Depths and overhead clearances are at **normal pool level.**

The rock awash near the E approach to John Day Locks in 45°43′25″N., 120°41′20″W. is marked by a light and sign; mariners are urged to exercise caution when passing N of Lake Umatilla Lighted Buoy 2, so as to avoid being carried to the NW and striking the rock awash.

Lake Umatilla, the pool created by John Day Dam, extends 65 (75) miles to McNary Dam. Depths are generally great, but there are many shoals. The winding channel through the lake has a controlling depth of about 19 feet and is marked by aids to navigation. The chart is the best guide. An overhead power cable with a clearance of 90 feet is about 41 (47.2) miles above John Day Dam.

John Day River is 2.3 miles above John Day Dam on the S side of the Columbia. Just S of the highway bridges over the entrance to the river is the **John Day River Recreation Area.** There are floats here for about 40 craft and a launching ramp. The fixed highway bridges have a clearance of 19 feet.

A grain elevator with barge-loading facilities is at **Arlington,** Oreg., 21.5 (24.7) miles above John Day Dam. A loading tower for the elevator is marked by a light. Small-craft moorage and a launching ramp are available at Arlington.

At **Boardman,** 45.6 (52.5) miles above the John Day Dam, there is a small-craft basin protected by a stone breakwater and a jetty. Berths and a launching ramp are available here.

A grain elevator and barge-loading pier are on each side of the river about 51.3 (59) miles above John Day Dam.

Umatilla is on the Oregon side 62 (71.3) miles above the John Day Dam.

There is a small-craft basin about 500 yards W of the highway bridge. The E side of the entrance is marked by a light. About 80 covered and uncovered berths, electricity, gasoline, diesel fuel, water, and ice are available. A concrete launching ramp is at the basin.

The fixed highway bridge across the river, 63 (72.5) miles above the John Day Dam, near Umatilla, has two navigational spans, each with a clearance of 85 feet. The N opening is generally used during high water as there is less current, but during low water it is unsafe. The power cables E of the bridge have a least clearance of 82 feet.

Charts 18541, 18542.-McNary Lock and Dam, 254.5 (292.9) miles above the mouth of the Columbia River and just above Umatilla, has a single lift lock with a vertical lift of about 75 feet. A **restricted area** is above the dam. (See 207.718, (a) through (v) and (w)(4), chapter 2, for information concerning use, administration, and navigation of McNary Lock and Dam.) Depths and overhead clearances are at **normal pool level.**

Lake Wallula, the pool created by McNary Dam, provides slack-water navigation from McNary Dam to the junction with the **Yakima River,** a distance of about 37 (43) miles. Depths in the lake are generally deep, but there are shoal spots; depths range from 14 to 115 feet. The channel is marked by aids to navigation as far as Richland, 40 (46) miles above McNary Dam.

The **Port of Umatilla,** on the Oregon side, about 0.4 mile above the McNary Lock and Dam, has a 218-foot port wharf with 918 feet of berthing space with dolphins; reported depths of 20 feet are available alongside. A grain elevator with a loading rate of 16,000 bushels per hour is just E of the port wharf, and a barge wharf, used for receipt of petroleum products, is just E of the elevator. The grain elevator is operated by the Pendleton Grain Growers Association, the oil wharf by the Tidewater Oil Co., and the port wharf by the Port of Umatilla.

Hat Rock State Park, on the S side about 5.5 (6.3) miles above McNary Dam, has a public launching ramp and offers excellent protection for small craft. Gasoline is available here.

Port Kelley, on the E side of Columbia River, 16 (19.5) miles above McNary Dam, has a large grain elevator and facilities for handling bulk grain by rail, truck, or water. The elevator loading rate is 30,000 bushels per hour. Unlighted ranges lead clear of the rock and shoal area in the middle ground 0.4 mile W of the facility.

A small boat moorage is in the bight just NE of

Port Kelley. Berths, electricity, gasoline, and water are available.

The **Port of Walla Walla** operates no public facilities, but leases property at **Wallula Junction** to a grain concern and a chemical company. A grain elevator and warehouse are here; both facilities have barge loading equipment. The elevator loading rate is 15,000 bushels per hour. The port also owns the land just S of **Attalia** occupied by a large papermill. Barge slips are at the mill.

Walla Walla River enters Columbia River on the E side 18.4 (21.2) miles above McNary Dam. There is a public launching ramp on the S side of the river just E of the highway bridges at the entrance.

About 1.9 miles S of the Snake River mouth, on the W side, is the Collier Carbon and Chemical Co. plant; anhydrous liquid ammonia and urea are received here by barge. The barge wharf is 400 feet long and has reported depths of 33 feet alongside. Two white ammonia storage tanks at this plant are prominent.

The railroad bridge crossing Columbia River, 27 (31) miles above McNary Dam, has a vertical lift span with a clearance of 11 feet down and 72 feet up. (See 117.760, chapter 2, for drawbridge regulations and opening signals.)

Charts 18545, 18546, 18547, 18548.–Snake River, 283 (325.2) miles above the mouth of Columbia River, rises in Yellowstone National Park, from which it winds S past the Grand Tetons, and thence for some 868 miles to its junction with the Columbia at Pasco, Wash.

From that junction for 119 (137) miles to Lewiston there were few facilities in 1973. (See the small-craft facilities tabulation on charts 18545, 18546, 18547, and 18548 for supplies and services available.) There are several marinas along the river at Lewiston where berths, gasoline, diesel fuel, water, ice, and marine supplies may be obtained.

Near its mouth, at the village of **Burbank,** Snake River is crossed by a railroad lift bridge with a clearance of 14 feet down and 60 feet up. (See 117.760, chapter 2, for drawbridge regulations and opening signals.) About 0.6 (0.7) miles above, there is a fixed highway bridge with a clearance of 61 feet. Numerous overhead cables with a reported minimum clearance of 43 feet cross Snake River between the fixed highway bridge and Ice Harbor Lock and Dam.

East Pasco, on the N side of Snake River 1 mile above the mouth, has extensive storage for grain, petroleum products, cement, and ammonia; the wharves are privately owned. From East Pasco to Lewiston there are no usable wharves.

Ice Harbor Lock and Dam, 8.4 (9.7) miles above the mouth of the Snake River, has a single lift lock with a vertical lift of about 100 feet. A **restricted area** (marked by lights, signs, and buoys) is above the dam. (See 207.718 (a) through (v) and (w)(5), chapter 2, for information concerning use, administration, and navigation of Ice Harbor Lock and Dam.) **Lake Sacajawea,** the lake formed by the waters behind Ice Harbor Dam, provides depths at slack water of 10 feet or more for a distance of 27.8 (32) miles to Lower Monumental Dam.

Lower Monumental Lock and Dam, 27.6 (31.8) miles above Ice Harbor Dam and about 36 (41.5) miles above the mouth of the Snake River, has a single lift lock with a vertical lift of about 100 feet. A **restricted area,** marked by lights, signs, and buoys, is above the dam. (See 207.718 (a) through (v) and (w)(6), chapter 2, for information concerning use, administration, and navigation of Lower Monumental Lock and Dam.)

The Snake River between Lower Monumental Dam and Little Goose Dam, 25 (28.8) miles above Lower Monumental Dam, is crossed by three fixed bridges with a least clearance of 52 feet; overhead power cables crossing the river between the two dams have a least clearance of 90 feet.

Little Goose Lock and Dam, about 25 (28.8) miles above Lower Monumental Dam and about 61.1 (70.3) miles above the mouth of the Snake River, has a single lift lock with a vertical lift of about 98 feet. **A restricted area,** marked by lights, signs, and buoys, is above the dam. (See 207.718, (a) through (v) and (w)(7), chapter 2, for information concerning use, administration, and navigation of Little Goose Lock and Dam.)

Lake Bryan, the pool formed by Little Goose Dam is crossed by a fixed highway bridge with a clearance of 60 feet about 10.7 (12.3) miles above the dam; overhead power cables with a least clearance of 75 feet cross the lake between Little Goose Dam and Lower Granite Dam.

Lower Granite Lock and Dam, about 31.5 (36.8) miles above Little Goose Dam and about 93.4 (107.5) miles above the mouth of the Snake River, has a single lift navigation lock 675 feet long and 86 feet wide. The dam, completed in 1975, permits navigation to **Lewiston,** Idaho, 120 (138) miles above the mouth of the Snake River. (See 207.718 (a) through (v) and (w)(8), chapter 2, for information concerning use, administration, and navigation of Lower Granite Lock and Dam.) In 1979, a fixed highway bridge with a design clearance of 60 feet through the center span was under construction across the Snake River about 1.5 miles below its junction with Clearwater River. A vertical lift highway bridge with a clearance of 10 feet down and 42 feet up crosses the Snake River between Lewiston, Idaho and **Clarkston,** Washington. (See 117.762, chapter 2, for drawbridge regulations.) In July 1980, a fixed highway bridge with a design clearance of 40 feet was under construction about 1.5 miles above the lift bridge. Overhead power cables with a minimum clearance of 80 feet cross the river between the dam and Lewiston.

Chart 18542.–Pasco, on the N side of the Columbia River 286 (329) miles above its mouth, is 32 (36.8) miles above McNary Dam. The 800-foot port wharf, leased to private interests, has about 16 feet alongside. A tank farm and a 500,000-bushel grain elevator are served by the wharf. The elevator loads barges at a rate of 500 tons per hour. Traffic at the port consists primarily of inbound petroleum products from Portland and outbound grain to Portland and Vancouver. A barge slip, about 400 feet wide and 800 feet long, is at the port's industrial park, about 1 mile below the railroad lift bridge. Paper products and molasses are received at this slip. The Port of Pasco is a municipal corporation with a Board of Commissioners and a General Manager. In addition to the marine terminal and the industrial park, the port operates an airport. The Pasco-Kennewick-Richland area is the most important commercial barging center above Portland.

The Pasco Yacht Basin, on the E side just below the railroad lift bridge, has berths, gasoline, diesel fuel, and marine supplies. Engine and electronic repairs can be made. An 8-ton hoist and a launching ramp are available at the basin.

Kennewick, on the S side of Columbia River opposite Pasco, has grain storage facilities and a public wharf where dry cargo is moved. At **Clover Island,** there is a large small-craft harbor. About 80 berths with electricity, gasoline, diesel fuel, water, and marine supplies are available. Hull, engine, and electronic repairs can be made. A 12-ton crane is at a marina occupying the center section of the island. A private yacht club is on the S side, and a Coast Guard station is on the E end of the island.

Four bridges cross the river in this area; the railroad lift bridge clearance is 18 feet down and 70 feet up. (See 117.760, chapter 2, for drawbridge regulations and opening signals.) The two fixed highway bridges 0.35 (0.4) mile W of the railroad bridge have a least clearance of 49 feet. The easternmost of the two fixed highway bridges is scheduled to be completely removed by June 1979. The fixed highway bridge 1.7 (2.0) miles W of the railroad bridge has a clearance of 61 feet. An overhead power cable crossing the river at the E end of Clover Island has a least clearance of 54 feet.

Columbia Park Recreation Area, 3.8 (4.4) miles above the upper fixed highway bridge at Pasco, has a small-craft marina at which berths, electricity, gasoline, water, a launching ramp, and marine supplies are available. Engine repairs can be made. Diesel fuel is available in the town of **Richland,** just above the recreation area.

The **Hanford Works,** a huge U.S. Department of Energy reservation, is on the S and W sides of the Columbia River about 13 (15) miles above Richland. The facility is devoted to energy research, development, and demonstration; production of nuclear materials; management of defense nuclear waste; and commercial nuclear fuel cycle research. The original site was created in 1943 under the direction of the Manhattan District of the Army Corps of Engineers for the production of materials for nuclear weapons such as those which helped to end World War II.

Priest Rapids Dam, 68 (78.3) miles above McNary Dam and 353 (407) miles above the mouth of Columbia River, completed and dedicated in 1962, is the head of navigation, although in its construction provision was made for later building of a navigational lock if needed. However, Richland is the present practical head of navigation.

Charts 18551, 18553.–Franklin D. Roosevelt Lake, Wash., is a National Recreation Area on the upper Columbia River impounded by the **Grand Coulee Dam** (47°57.5′N., 118°59.0′W.). Information about facilities and services is available at the recreation area headquarters in the town of Coulee Dam, the visitors' center at Fort Spokane, and the ranger station at Kettle Falls.

A **restricted area** has been established in the discharge channel of the Grand Coulee Dam, and extending about 2.5 miles downstream from the dam. (See 162.230, chapter 2, for limits and regulations.)

Chart 18554.–Lake Pend Oreille (48°10′N., 116°25′W.), Idaho, is a recreation area nearly surrounded by the Kaniksu National Forest. The charted depths are based on a lake level of 2048.15 feet above mean sea level. Normal winter and summer lake levels are about 3 feet and 14 feet above the charted depths, respectively. Lake level information can be obtained as follows: taped message, updated every Monday, telephone (208-263-3019); daily corrected information, Corps of Engineers, Albeni Falls Dam, telephone (208-437-3133). Marina services at **Sandpoint,** on the N side of the **Pend Oreille River** at its junction with Lake Pend Oreille, include berthing, gasoline, a launching ramp, winter storage, and hull and engine repairs. The drawspan of the railroad bridge across the Pend Oreille River, at the river and lake junction, is in the permanently closed position. (See 117.815, chapter 2, for regulations.) The bridge clearance is 14 feet. Additional information about facilities and services may be obtained from the Sandpoint Chamber of Commerce, Sandpoint, Idaho 83864.

11. COLUMBIA RIVER TO STRAIT OF JUAN DE FUCA, WASHINGTON

This chapter describes the Pacific coast of the State of Washington from the Washington-Oregon border at the mouth of the Columbia River to the northwesternmost point at Cape Flattery. The deep-draft ports of South Bend and Raymond, in Willapa Bay, and the deep-draft ports of Hoquiam and Aberdeen, in Grays Harbor, are described. In addition, the fishing port of La Push is described. The most outlying dangers are Destruction Island, marked by a light and fog signal, and Umatilla Reef, marked by a lighted buoy.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1370 through 80.1380, chapter 2.

Chart 18500.–From Cape Disappointment, the coast extends N for 22 miles to Willapa Bay as a low sandy beach, with sandy ridges about 20 feet high parallel with the shore. Back of the beach, the country is heavily wooded. Numerous summer resorts and cottages are along the beach. Landmarks along this section of the coast are few. The 10-fathom curve averages a distance of about 2.5 miles from the shore. There are no known offlying dangers S of the Willapa Bay entrance bar.

Weather.–The weather along this coast is usually mild, windy, and rainy in winter, cool and pleasant in summer, with some periods of fog. Close to shore, and particularly in Willapa Bay and Grays Harbor, wind and fog conditions are often local and different from conditions offshore. Radiation fog often blankets these bodies of water, as well as rivers and shore points, in fall and winter. It can form any time when nights are clear and calm.

Storms that move along this coast or a distance out to sea bring cloudy days with highs in the midforties and lows in the middle to upper thirties. In winter, they cause rain on about 15 to 25 days per month and significant snow on 2 or 3 days. They are responsible for predominantly E to SE winds from October through March; these winds reach gale force 3 to 6 percent of the time. In the intermittent periods of settled weather, fog becomes an early morning hazard over rivers and protected bays. Visibilities drop below 0.5 mile on 3 to 4 days per month, from October to February. Fog signals in waters like Grays Harbor operate up to 35 percent of the time.

With the coming of spring, conditions improve. Storms become less frequent. Winds diminish and blow more from a W direction. Temperatures often rise into the low to middle fifties during the day and fall to the low forties at night. Visibilities are usually good, and rain falls on just 8 to 15 days per month.

Summer is the true fog season along these shores. In general, advection fog reduces visibilities to below 0.5 mile on 3 to 10 days per month; up to 16 days per month at Tatoosh Island. Fog signals blow 15 to 30 percent of the time. Conditions are worst in Grays Harbor and near the entrance to the Strait of Juan de Fuca. Temperatures are often in the sixties during the day and around 50°F at night. Winds are from a W to NW direction and usually less than 17 knots; calms occur up to 12 percent of the time. It rains on about 5 to 10 days per month.

Fog remains a problem in autumn, although it is less frequent. Temperatures drop slowly with daytime readings often in the low to midsixties, dropping to the upper forties at night. Rain falls more often. Winds become stronger and return to an E direction.

Chart 18504.–Willapa Bay entrance is 24 miles N of the Columbia River entrance. The bay with its several tributaries provides an outlet to an extensive area of valuable timber. Oyster beds cover much of the shoaler areas of the bay. Logs and lumber are shipped from Raymond; lumber, fish, and other sea foods are shipped by rail.

Prominent features.–Leadbetter Point, the N extremity of **North Beach Peninsula,** is the S point of the entrance to Willapa Bay. It is low and sandy, and has no distinctive feature to mark its extremity; the chart limit of the trees is 2.2 miles S.

Cape Shoalwater, the N point at the entrance, terminates in a low bluff about 50 feet high. The cape is sandy, and N portion is covered with trees to within 300 yards of the point.

Willapa Bay Light (46°44.1'N., 124°04.6'W.), 113 feet above the water, is shown from a white house on a 64-foot skeleton tower on the N side of the entrance; a radiobeacon is at the station.

The N shore of the entrance to the bay is marked by timbered bluffs and ridges, several hundred feet high. In the daytime, scars on the cliffs often are visible before the light can be seen. The termination of the tree line on Leadbetter Point is sharply defined.

The entrance is in the N part of the bay, which consists of two arms; the S, 18 miles long, and the E, 10 miles long. Both arms are filled with extensive shoals, large areas of which bare at low water. The S arm is separated from the ocean by a strip of low sand and sand dunes, averaging 1.5 miles in width and covered with trees until within 2.2 miles of Leadbetter Point. Numerous cottages and summer resorts are along the seaward face of the narrow peninsula. The shore of the bay elsewhere is composed of low, rolling hills, 100 to 200 feet high, covered with dense growths of timber.

Willapa Bar extends about 3 miles outside of a line joining Willapa Bay Light and Leadbetter

Point. The bar channel is continually shifting, and depths over it vary from season to season. Because of the frequent changes in the position of the bar and difficulty in dredging the bar to project depth, depths have consistently been less than the 26-foot project depth. The buoys marking the channel through the bar are moved from time to time because of the shifting sands and changing channel. Dredging range lights are temporarily established at the entrance at times during dredging operations. They do not necessarily mark the best water. The major channels in the bay are marked by aids to navigation.

Willapa River flows into the E arm of the bay. Lights, buoys, daybeacons, and lighted and unlighted ranges mark the channel through the E arm and Willapa River to South Bend and Raymond.

COLREGS Demarcation Lines.–The lines established for Willapa Bay are described in 80.1370, chapter 2.

Channels.–A Federal project provides for a 26-foot channel over the bar at the mouth of Willapa Bay, and a 24-foot channel from deep water in Willapa Bay to just above both forks of Willapa River at Raymond. The channel over the bar into Willapa Bay is subject to frequent change. (See Notice to Mariners and latest editions of charts or check with the local pilots for controlling depths.)

Anchorage with good holding ground may be had at almost any point inside the bay. The anchorage generally used is off Toke Point in 30 to 40 feet, about 4.5 miles SE of Willapa Bay Light.

Tides.–The mean range of tide at South Bend is 7.8 feet, and the diurnal range of tide is 9.8 feet. A range of about 14 feet may occur at the time of maximum tides.

Currents.–In the entrance the current velocity is about 2.5 knots. Currents of 4 to 6 knots occur at times; the velocity is greatest on the ebb, particularly with S wind.

In the channel at South Bend, the velocity is about 1.2 knots on the flood and 1.4 knots on the ebb. (See Tidal Current Tables for predictions for South Bend.)

Routes.–From N or S, the course to Willapa Bay should be shaped to make the outermost lighted whistle buoy. From seaward in clear weather, the lights at the entrance of Grays Harbor, 14 miles N, and at North Head, 22 miles S, are distinguishing marks for fixing a vessel's position and the subsequent shaping of the course.

Approaching from any direction in thick weather, great caution is essential. The currents are variable and uncertain. Velocities of 3 to 3.5 knots have been observed between Blunts Reef and the Swiftsure Bank, and velocities considerably in excess of these amounts have been reported. Under such conditions, vessels should not shoal the water to less than 20 fathoms until the lighted whistle buoy off the entrance has been made.

Navigators of deep-draft vessels should bear in mind the changeable nature of the bar. Strangers should not navigate the bay in thick weather.

South Bend is on the S bank of Willapa River, 8 miles above Toke Point. The principal industries are lumbering, oystering, and fishing; two canneries are operating here. Willapa Harbor Airport is on the N bank of the river about 2.5 miles NW of South Bend. **Raymond,** the principal town, is on the S bank of Willapa River at the junction of the South Fork, 3 miles above South Bend. There are sawmills here, and large quantities of lumber are shipped out.

The main turning basin at the junction of the North and South Forks is used by ships up to 600 feet long and of draft corresponding to the controlling depth of the channel. Ships turning usually head up the South Fork, back with the aid of a small tug into the North Fork, then straighten out down the main river.

Bridges–There are no bridges over the main channel. A railroad swing bridge across South Fork, 0.3 mile above its mouth, has a clearance of 8 feet. The highway swing bridge across North Fork at Raymond has a clearance of 14 feet. (See 117.770, chapter 2, for drawbridge regulations and opening signals.) Two fixed highway bridges over South Fork about 0.5 mile above the railroad swing bridge have a least clearance of 15 feet. A railroad fixed bridge over **Ellis Slough** has a clearance of 24 feet.

At The Narrows, 1 mile below the Port of Willapa Harbor wharf, the river is crossed by power cables with a minimum clearance of 165 feet.

Pilotage.–Pilotage is compulsory for all registered vessels. The Grays Harbor Pilot Association, serving Grays Harbor and Chehalis River, maintains an office at Aberdeen, Washington, and a station at Westhaven Cove, Westport, Washington. The station and pilot boats monitor VHF-FM channels 12 (156.60 MHz) and 16 (156.80 MHz) and use both as working channels. The pilot boats, CHEHALIS and GRAYS HARBOR, are 65 and 60 feet long, respectively, and each has a green hull and orange pilot house. Arrangements for pilots can be made by ships' agents by telephone (206-532-2761), or by radio on VHF-FM channels 12 and 16. A 4-hour advance notice of arrival is requested; any change in the estimated time of arrival requires notice to the pilot via radio station KLB, Seattle, Washington, or VHF-FM channels 12 or 16.

Pilots board vessels near Grays Harbor Approach Lighted Whistle Buoy GH (46°51.9'N., 124°14.3'W.). To assist pilots in boarding from the bow of the pilot boat, the ship is requested to maintain a speed of 6 or 7 knots. A pilot ladder should be rigged near amidships on the leeward side clear of the gangway or other obstructions and about 9 to 12 feet above the water. In rough weather, pilots may board during daylight.

Towage.–Tugs to 750 hp are available in South Bend, and tugs to 1,075 hp are available at Grays Harbor. Arrangements should be made in advance through ships' agents or through the pilots.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1, for details.)

(See 207.720, chapter 2, for logging regulations for Willapa Bay and tributaries.)

South Bend and Raymond are **customs ports of entry.**

Wharves.–The Port of Willapa Harbor maintains a terminal with a 600-foot wharf on the S bank of the river, about 1 mile below Raymond; the wharf is 0.7 mile below the junction of the North and South Forks of the river. Depths alongside the face of the wharf are reported to be 24 feet at the W end and 28 feet at the E end. The deck height is 17 feet. There are 6,660 square feet of covered storage behind the wharf. Four 30-ton cranes are operated by the port; logs and lumber are shipped from the wharf. The only other deep-draft berth is a private lumbermill wharf 0.5 mile above the port wharf.

Supplies.–Diesel oil, gasoline, water, and some marine supplies are available. Both South Bend and Raymond have small-craft moorages operated by the respective towns. One of the Port of Willapa Harbor's four 30-ton cranes at the port wharf is available for hauling out private small craft.

Repairs.–The largest of two marine railways at South Bend can handle vessels 60 feet long and 19½ feet wide for hull repairs. A nearby machine shop and foundry does some engine repair work.

Tokeland on **Toke Point,** is a summer resort. There is a small-craft basin on the N side of the point. The entrance channel and basin are maintained by the Port of Willapa Harbor; a light is on the outer end of a jetty on the S side and a daybeacon is on the N side of the entrance. In September 1980, depths of 7 feet were available in the channel; however, extensive shoaling was reported inside the basin and around the mooring floats; many of the floats ground at low water. Berths with electricity, gasoline, diesel fuel, water, and ice are available either at the basin or nearby. A Coast Guard station is on Toke Point.

North River, which enters the E arm 2 miles E of Toke Point, is navigated by small logging launches. The channel is marked by privately maintained daybeacons, and is navigable at high water to **Eaton's Ranch,** 3 miles above the last daybeacon.

The S part of Willapa Bay is used by light-draft vessels. **Bay Center** is a village just S of **Goose Point** (46°38.2'N., 123°57.5'W.). It is one of the many oyster places in this bay; there is also some fishing and crabbing. There are floats here for mooring fishing vessels; gasoline is available.

The channel to Bay Center leads from deep water in Willapa Bay about 1.4 miles WNW of Goose Point, thence N of Goose Point, and thence S into Palix River to the basin at Bay Center. The channel is marked by lights and buoys. A private unlighted range marks the entrance channel from Willapa Bay, however, a November 1978 survey showed that the channel had shifted and natural deep water was S of the range line. The channel is subject to continual change and the buoys are frequently shifted to mark the best water. In November 1980, the controlling depth through the dredged section in Palix River to the basin at Bay Center was 4 feet, thence 2 to 6 feet in the basin except for shoaling to less than 1 foot in the NW corner.

Palix River, on the E side of the bay, is navigable for small logging tugboats and fishermen for about a mile up each of the three forks above their junction. The fixed highway bridge, about a mile below the forks, has a clearance of 15 feet.

Nemah River Channel, 5 miles S of Goose Point, is marked by privately maintained aids. Controlling depths are about 4 feet to Daybeacon 20, thence 2 feet to Lynn Point, thence 1 foot to the junction of South and Middle Nemah Rivers.

Nahcotta Channel, about 4.5 miles S of Goose Point, leads S between North Beach Peninsula on the W and Long Island Shoal and Long Island on the E to Shoalwater Bay. The channel is well marked and has depths greater than 20 feet.

Stanley Channel leads from Nahcotta Channel at Long Island Junction Light, thence E of Long Island and **Stanley Peninsula** to the mouth of Naselle River. Shallow-draft boats with local knowledge can cross **Long Island Shoal.**

Long Island, 5.5 miles long in a NW direction and of irregular width, wooded, and rising to over 100 feet in elevation, lies in the S arm of the bay near the head and nearly fills it.

Nahcotta, on the E side of North Beach Peninsula, is a small village 9 miles S of Leadbetter Point. There are several large oyster plants here. The boat basin at Nahcotta has floats for small craft; a 2-ton hoist is available. In September 1977, the marked channel leading from deep water in Nahcotta Channel to the basin had a least depth of 8 feet at the entrance. Depths of 7 feet were available in the basin with ½ to 5½ feet at the floats.

Storm warning signals are displayed. (See chart.)

Naselle River, on the E side of the bay, is navigable by boats of 5 feet or less draft, at half tide or higher water, as far as the bridge at the village of **Naselle,** 10 miles above the mouth. This bridge marks the head of tide water at ordinary high tides. A highway bridge over the river at **Mill Ranch,** about 2.2 miles above the mouth, has a swing span with a clearance of 9 feet. (See 117.770, chapter 2, for drawbridge regulations and opening signals.) Between the bridges the river has numerous snags and submerged logs, and is crossed by power cables with least clearance of 60 feet; passage should not be attempted without local knowledge. Small logging and fishing boats operate on the river.

Bear River enters at the SE corner at the head of **Shoalwater Bay.** A long, tortuous, unmarked channel across the flats makes entrance to the river difficult. Vessels of 5-foot draft or less can make the fixed bridge about 1.5 miles above the mouth at half tide.

Chart 18500.–From Cape Shoalwater to Point Chehalis, the S point at the entrance to Grays Harbor, the coast extends for 11 miles as a low sand beach, backed by a heavy growth of timber.

Chart 18502.–Grays Harbor entrance is about 40 miles N of Cape Disappointment and 93 miles S of Cape Flattery. The bay and its tributaries furnish an outlet to an extensive timber area. Grays Harbor is an important lumber port in the foreign and domestic trade. Oil is delivered by tanker; logs, lumber, pulpwood, and wood chips are shipped out.

The bay at the entrance is about 2 miles wide, but shoals extending S from Point Brown contract the navigable channel to a width of 0.7 mile. From its entrance the bay extends E for 15 miles to the mouth of Chehalis River. The bay is filled by shoals and flats; these bare at low water and are cut by numerous channels.

Point Chehalis is low and sandy and is bare of trees for 1.5 miles S of its extremity. A jetty extends seaward from the end of the point. A Coast Guard lookout tower is prominent on the point.

Storm warning signals are displayed. (See chart.)

Grays Harbor Light (46°53.3'N., 124°06.9'W.), 123 feet above the water, is shown from a 107-foot white truncated octagonal pyramidal tower on the seaward side of Point Chehalis. A radiobeacon and a fog signal are about 1.2 miles NW of the light, near the inner end of the breakwater.

Point Brown, the N entrance point, is 2.5 miles N of Point Chehalis; it is low, rounding, and sandy, with shoals extending S and W which, together with those extending W from Point Chehalis, form the bar at the entrance. The point is wooded to within 0.5 miles of the extremity. A jetty extends W from the point. A small-craft basin is NE of the point. The entrance to the basin is marked by lights; the approach channel is marked by a line of lighted and unlighted dolphins. A submerged jetty extends about 0.6 mile NE from the N side of the basin entrance. About 150 berths, with electricity, transient berths, gasoline, diesel fuel, water, ice, and some marine supplies, are available. A 30-ton mobile hoist can handle small craft for minor engine repairs. Reported depths of 5 feet are available through the natural channel leading to the basin with similar depths inside the basin.

Storm warning signals are displayed. (See chart.)

Prominent features.–The country about Grays Harbor is flat and featureless, with few conspicuous objects. **Saddle Hill** (chart 18500), about 310 feet high, 8 miles N of the entrance and 2 miles inshore, is the most conspicuous feature.

Grays Harbor Light shows prominently on a closer approach to the entrance. A large water tank, painted a red and white checkerboard pattern, is 3.6 miles NNE of the N jetty and a large rust-colored standpipe, lighted at night by floodlights, is 2.5 miles SSE of Point Chehalis. Both these objects are prominent on a closer approach, and the standpipe is reported to be visible for a considerable distance at night. In clear weather, **Brackenridge Bluff,** on the N shore 6 miles inside the entrance, is quite prominent. It is a reddish cliff about a mile long, rising in two places to a height of 80 feet; from seaward it is visible only through the entrance.

In clear weather **Neds Rock,** off Brackenridge Bluff shows prominently from inside the entrance; it is reddish.

COLREGS Demarcation Lines.–The lines established for Grays Harbor are described in 82.1375, chapter 2.

Channels.–The entrance to Grays Harbor, between two jetties, is marked by two lighted ranges and buoys. Inside the bay, a 30-foot Federal project channel leads to Cosmopolis, about 9 miles above the bay entrance. The channel inside the bay to Cosmopolis is well marked. There is no deep-draft navigation above Cosmopolis. (See Notices to Mariners and latest editions of the charts for controlling depths for the dredged channel.)

The jettied entrance has a tendency to shoal at the curve on the Point Chehalis side. Submerged sections of the N and S jetties extend seaward about 0.2 and 0.9 mile, respectively, from the visible sections. A lighted horn buoy is off the submerged section of the S jetty.

Anchorage.–The best anchorage is N of Westport and SE of Damon Point in 30 to 60 feet. The holding ground is good, and there is more swinging room here than elsewhere in the harbor.

Tides.–The mean range of tide at Aberdeen is 7.9 feet, and the diurnal range of tide is 10.1 feet. A range of about 14 feet may occur at the time of maximum tides. (See the Tide Tables for daily predictions for Aberdeen, Wash.).

Currents.–In the entrance, the average current velocity is about 1.9 knots on the flood and 2.8 knots on the ebb, but velocities may reach 5 knots. In the channels through the bay, the velocities seldom exceed 3 knots. It was reported that currents in the vicinity of the bar are very erratic, setting N close inshore and S offshore. (See Tidal Current Tables for daily predictions at the entrance to Grays Harbor.)

Routes.–From N or S, the course should be shaped to make the entrance buoy. From seaward in clear weather, Saddle Hill, 8 miles N of the entrance, and Grays Harbor Light on Point Chehalis will be seen.

Approaching from any direction in thick weather, great caution is essential. The currents are variable and uncertain. Velocities of 3 to 3½ knots have been observed between Blunts Reef and Swiftsure Bank, and velocities in excess of these amounts have been reported. Because of the possibility of a strong onshore set, especially in SW weather, vessels should not shoal the depths to less than 20 fathoms unless sure of the position.

The bar channel is subject to change. Deep-draft vessels should not enter without knowledge of conditions at the time of entering. The deepest water is not always on the range. Information concerning conditions on the bar can be obtained from the Grays Harbor Pilots Association or from the Coast Guard on VHF-FM channel 16 (156.80 MHz). The bar channel and harbor should not be attempted in thick weather.

Pilotage for Grays Harbor is discussed under Pilotage, earlier this chapter.

Westhaven Cove, on the inner side of the N tip of Point Chehalis, is protected by breakwaters marked by lights. The harbor is a large sport and commercial fishing center operated by the Port of Grays Harbor.

In 1972, the midchannel controlling depths in the entrance channels were 15 feet; depths of about 7 to 16 feet were in the cove. In July 1980, the NW entrance channel to the cove was reported to be almost blocked due to shoaling which extends NE from the S breakwater; caution is advised. Mariners are advised to use the SE entrance channel.

A Coast Guard station is on the S side of Westhaven Cove. The town of **Westport,** a summer resort and fishing town, is about a mile S of Westhaven Cove.

Westhaven Cove has about 550 berths, with electricity, about 20 transient berths, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies. A boatyard at the S end of the harbor has a mobile lift that can handle craft to 30 tons for hull or engine repairs; the yard includes a ship chandlery. Electronic repair service is available at the harbor. The Grays Harbor pilot boat is berthed at Westhaven Cove.

Storm warning signals are displayed. (See chart.)

The Coast Guard has established a **rough bar advisory sign,** 20 feet above the water, visible from the channel looking seaward, on the N side of Westhaven Cove, to promote safety for small-boat operators. The sign is diamond shaped, painted white with an international orange border, and with the words "Rough Bar" in black letters. The sign is equipped with two alternating quick flashing yellow lights. The lights will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

Bay City, 3.7 miles SE from Westhaven Cove, on the E shore of **South Bay** formerly was a whaling station. The wharf, built originally for the old fertilizer factory, is now in ruins, and there are no marine facilities now at Bay City. The fixed highway bridge at Bay City has a clearance of 39 feet.

For the rest of the 2.6-mile distance, South Bay is crooked and full of shoals to the mouth of **Elk River,** which is used some for logging.

Markham, site of a large cranberry plant and a small seafood company, is on the S side of the bay at the mouth of **Johns River,** a shallow stream crossed by a fixed highway bridge with clearance of 33 feet, near the entrance. Above the bridge, the stream is navigable only for rowboats.

Hoquiam and **Aberdeen** are twin cities about 14 miles above the harbor entrance. Hoquiam is on the river of that name, and Aberdeen is on Chehalis River. South Aberdeen is across the river, but is part of the city of Aberdeen.

Cosmopolis is a small town on the S side of Chehalis River just above South Aberdeen. There is a large pulpmill here.

Chehalis River enters at the E end of Grays Harbor and is marked by lights and daybeacons. It is navigable by small boats to **Elma,** 24 miles above the mouth. The upper portion of the river, for a distance of about 45 miles above Elma, is used for floating logs.

Montesano, about 14 miles above Aberdeen, has several mills. This stretch of the river is used only by log tows and outboard motorboats. A small-boat moorage is on the N bank between the highway and railroad bridges S of Montesano.

Towage.–Tugs up to 1,075 hp are available at Aberdeen. Arrangements for a tug should be made in advance either through the Grays Harbor Pilots Association or ships' agents. Tugs monitor and use as working frequency VHF-FM channel 9 (156.45 MHz).

Bridges.–The main channel of Chehalis River is crossed by two bridges at Aberdeen, the railroad swing and highway bascule bridges 1.4 miles above Cow Point; the least clearance is 11 feet. At South Montesano is a railroad swing bridge with a clearance of 8 feet and just above it is a fixed highway bridge with a clearance of 29 feet. The railroad swing bridge is maintained in the open position. In the 6-mile stretch between Montesano and Elma there are two fixed bridges having least clearance of 8 feet. At Cosmopolis, 5.5 miles above the mouth, is a power cable with a clearance of 125 feet. Between this point and Montesano the least clearance of power cables is 59 feet.

The Hoquiam River is crossed by a swing bridge, bascule bridge, and a lift bridge within 0.7 mile of the mouth. Least clearances are: 11 feet for the swing bridge; 25 feet for the bascule bridge; and 4 feet down and 65 feet up for the lift bridge. The railroad swing bridge about 2 miles above the mouth has a clearance of 5 feet. Overhead power and television cables with clearances of 54 feet cross the river about 1 mile above the mouth. A power cable across the N draw of the railroad swing bridge 2 miles above the mouth has a clearance of 43 feet; the power cable just above the bridge has a clearance of 75 feet.

The Wishkah River is crossed by two swing bridges and one bascule bridge within 0.4 mile of the mouth; least clearance is 8 feet. A fixed bridge about 1 mile above the mouth has a clearance of 16 feet. The least clearance of overhead power cables close below and above this fixed bridge is 30 feet. (See 117.1b, 117.775, 117.776, and 117.810, chapter 2, for drawbridge regulations and opening signals for bridges crossing the Chehalis, Hoquiam, and Wishkah Rivers.)

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Aberdeen is a **customs port of entry.**

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1, for details.)

Harbor regulations.–The Port of Grays Harbor Commission appoints a port manager who directs the facilities and port affairs of the harbor district, which is coextensive with Grays Harbor County. The Port of Grays Harbor general offices are at

111 South Wooding Street, about 500 yards from the inshore end of Terminal Pier 1.

(See 207.730, chapter 2, for logging regulations for Grays Harbor and its tributaries.)

Wharves.–The Port of Grays Harbor operates two marine terminals. Seven deep-draft berths are available with electrical shore power connections; water is available at Terminal 1. Five of the port's berths are open wharves with two equipped for petroleum discharge and one available for petroleum bunkering. In addition to the port-operated facilities described, there are more than eight private deep-draft piers and wharves in the Hoquiam, Aberdeen, and Cosmopolis area. Only the major deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 35, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported. (For information on the latest depths contact the port authorities or the private operators.)

Port of Grays Harbor facilities:

Terminal 1 (46°58'00"N., 123°51'20"W.): N side, 1,100-foot berthing space; 35 feet alongside; S side, 878-foot berthing space; 25 feet alongside; deck heights, 18 feet; 47,000 square feet of covered storage; receipt and shipment of general cargo, receipt of petroleum products, shipment of lumber, pulp, logs and other forest products, and bunkering vessels. This is the only place on the Washington coast between Columbia River and Puget Sound that deep-draft vessels may take on fuel.

Terminal 4 (46°57'40"N., 123°50'14"W.): 1,400-foot berthing space; 35 feet alongside; deck height, 18 feet; 51 acres surfaced, open storage; two 50-ton gantry cranes travel the entire length of the wharf, one 40-ton high-speed container crane, one 60-ton bridge crane, at the W end of the wharf, is equipped with a 50-ton log grapple; 10 log-handling machines with capacities to 45 tons; receipt and shipment of logs and containerized general cargo.

Private facilities:

Rayonier, Inc. Wharf (46°58'09"N., (123°52'18"W.): 600-foot berthing space with dolphins; 26 to 32 feet alongside; deck height, 21 feet; receipt and shipment of wood pulp; receipt of rafted logs, and fuel oil for plant consumption; owned and operated by ITT Rayonier Inc.

Weyerhaeuser Aberdeen Saw Mill Wharf (46°58'27"N., 123°47'57"W.): 900-foot berthing space; 29 to 31 feet alongside; deck height, 16 feet; one stiff-legged derrick for loading chips, one log handler; receipt of logs, shipment of chips and lumber; owned and operated by Weyerhaeuser Co.

Weyerhaeuser Log Wharf (46°58'02"N., 123°46'42"W.): 403-foot berthing space; 32 feet alongside; deck height, 16 feet; 27 acres of open storage; shipment of logs; owned and operated by Weyerhaeuser Co.

Supplies.–Bunker fuel, diesel oil, lubricants, water, and some marine supplies are available for large vessels at Grays Harbor. Complete service and repair facilities for small craft are available at Westhaven Cove, Aberdeen, and Hoquiam.

Repairs.–There are no facilities for major repairs to large oceangoing vessels in Grays Harbor; the nearest such facilities are in Portland, Oreg. There are several marine railways in Grays Harbor, the largest of which is at a shipyard on the S bank of the Hoquiam River a mile above its mouth. This railway can handle vessels to 200 tons, 100 feet long or 21 feet wide for hull repairs. Machine shops and foundries are nearby and can make some engine repairs. Electronic repair service is available.

Communications.–Grays Harbor is served by the Burlington Northern; Chicago, Milwaukee, St. Paul and Pacific; and Union Pacific Railroads. Two U.S. highways serve Aberdeen and Hoquiam. Bowerman Airport, owned and operated by the Port of Grays Harbor, is on an extensive filled area just W of Hoquiam; there are scheduled flights to Seattle, Portland, Astoria, and points beyond.

North Bay, immediately E of Point Brown, is a shallow bight about 6 miles long. It is filled with shoals and flats that bare at low water. There is some oyster culture in the bay, which is used considerably by small oyster boats. The entrance to the bay is marked by buoys.

Hoquiam River empties into Grays Harbor about 2 miles W of the mouth of Chehalis River. It is practically a tidal slough 11 miles long. In November 1980, the midchannel controlling depth was 6 feet from the mouth of Hoquiam River to the junction of the Hoquiam River and the East Fork of the Hoquiam River, a distance of about 2.5 miles. Traffic on the river consists of log tows, tugs, and other small craft. Between the mouth of the river and its junction with the East Fork, the river is crossed by a bascule bridge and 2 swing bridges with least clearances of 5 feet and by a lift bridge with clearances of 4 feet down and 65 feet up. Overhead power and TV cables crossing the river have a least clearance of 43 feet. (See 117.775(b), chapter 2, for drawbridge regulations and opening signals.)

Wishkah River empties into the N side of Chehalis River in the E part of Aberdeen. It is little used.

Chart 18500.–From Point Brown the coast extends N for 23 miles to Point Grenville as a low, sandy beach, broken occasionally by small streams and in some places by bluffs. A few small towns and settlements, connected by roads or trails, are scattered along this stretch.

Copalis Head, 13 miles N of Point Brown, is a bright yellow bluff 2 miles long and 200 feet high. It is 1.5 miles N of **Copalis River, Copalis Rocks,** two small rocks the larger 34 feet high, lie 500 yards off the head, and a rock awash is about 0.5 mile WSW of the head.

Two small bluffs mark the mouth of **Joe Creek,** 3.5 miles N of Copalis Head.

Moclips River entrance is 6 miles N of Copalis Head. The S point at the mouth is bare and sandy;

on the N bank is a bright yellowish bluff 50 feet high. **Moclips,** near the mouth of this river, is connected by a branch of the Burlington Northern Railroad with Hoquiam on the N shore of Grays Harbor. A triangular-shaped yellowish bluff about 110 feet high on the S bank of **Wreck Creek,** which empties about 2.5 miles N of Moclips, is prominent from offshore.

Point Grenville, 10 miles N of Copalis Head, is a broken rocky promontory with nearly vertical whitish cliffs over 100 feet high. **Point Grenville Light** (47°18.3'N., 124°16.6'W.), 135 feet above the water, is shown from a white skelton tower on the point. Numerous rocks extend for some distance off the point. **Grenville Arch,** dark in color, 83 feet high, is the outer and more prominent of two rocks lying W of the point; it is over 0.5 mile SW of the inner extremity of the point. The arch lies E and W. A rock that uncovers is 400 yards NW of Grenville Arch. The W rock, off the W end of the point, is 200 yards off the cliff and 92 feet high. There are several rocks inside of it, but none outside. Two rocks, over 90 feet high, are 400 yards S of the S extremity of the point.

An indifferent anchorage in NW weather may be had under Point Grenville by vessels of moderate draft, but the depths compel anchoring at such a distance from the beach that little shelter is afforded. The anchorage is in 4 fathoms, sandy bottom, with the inner extremity of the point bearing **338°**, and Grenville Arch bearing **239°**. This anchorage is not recommended for ordinary use.

N of Point Grenville is a series of cliffs; the upper part appears light gray, the lower part dark, separated by a well-defined line of demarcation. This formation disappears near the S end of the cliffs where they are broken up and present a stratified appearance. The strata slope downward to the N. North of the cliffs is a shingle beach followed by irregular bluffs and cliffs terminating near Taholah in white cliffs of uniform height, which from offshore do not present the stratified appearance noticeable to the S.

Quinault River breaks through the cliffs about a mile SE of Cape Elizabeth. **Taholah** is an Indian village on the banks of the river. The shoreline in this section is low. The river is navigable only by skiffs and outboard motorboats. Some gasoline and supplies are available. A piling dike has been built along the spit in front of the village. In the background is a ridge with three long, flat summits. The road serving the beach settlements, and connecting them with Hoquiam, terminates at Taholah.

From Taholah to Cape Elizabeth the cliffs present an almost unbroken face seaward and in places are about 200 feet high. They appear either white or bright yellow, and from offshore present a very noticeable statification, sloping downward to the S; an important difference from the direction of slope around Point Grenville.

Sonora Reef extends SSE from Cape Elizabeth for over 2 miles, its S end lying 1.1 miles offshore.

Cape Elizabeth projects about a mile from the general trend of the coast, and when seen from seaward appears as a bright yellow, rocky cliff reaching in places a height of 200 feet. There are no high or large rocks off the cape. A little less than a mile SSE and SSW, lie two rocks awash, and inside of these, less than 0.5 mile from the extremity of the cape, are some small visible rocks that break. The houses of the Quinault Indian Reservation are at the E end of the cliffs.

From Cape Elizabeth for 20 miles to Destruction Island, the coast is nearly straight, with low shores and rocky cliffs heavily wooded to the edges. Numerous rocks lie offshore, but these are inshore of the usual track of vessels.

Flat Rock, low and black, is 1.6 miles NW from Cape Elizabeth and 0.9 mile offshore. A covered rock which breaks in ordinary weather is 400 yards S of it. A small rock is halfway between Flat Rock and Cape Elizabeth, with a smaller one inside halfway to the beach.

Pratt Cliff, 3 miles N of Cape Elizabeth, is a sharp point backed by cliffs, 139 feet high. **Split Rock,** 70 feet high, is 1 mile offshore, abreast of the N end of Pratt Cliff. It is split in two, and the division shows when seen from W to NW. A small, low, black rock is 0.5 mile S of it, and a larger one is 0.4 mile S of Split Rock.

Willoughby Rock, 120 feet high, 0.4 mile NE of Split Rock, is nearly round with an abrupt seaward face. A cluster of rocks is between Willoughby and Split Rock and a little S of them; one is black and conical, with a rock awash 200 yards SW from it.

Sealion Rock, 8 feet high, small and black, is 3 miles NW of Split Rock and 2.6 miles offshore.

From Pratt Cliff to **Raft River,** 3.5 miles, the coast consists of broken cliffs over 100 feet high bordered by rocks extending over 0.5 mile offshore. Midway between these points are three rocky heads covered with trees to the edges projecting beyond the cliffs and almost detached from them.

Tunnel Island, 157 feet high, is in the entrance to Raft River, and at low water is connected with the S point of the river. A vertical pillar, 108 feet high, stands 150 yards NNW of the rock, and a cluster of rocks is close-to under its SE point.

From Raft River to Queets River, 4.5 miles, the coast consists of cliffs about 80 feet high, broken occasionally by small streams.

Queets River is the largest stream between Grays Harbor and Cape Flattery. The S point is a low, sandy spit about 0.1 mile long, projecting from an abrupt cliff, 80 feet high, and densely wooded. The N point is 1.3 miles long, low, and sandy, with some trees at the mouth of the river, and a narrow lagoon between it and the bluff.

From Queets River for 10 miles to abreast Destruction Island, the coast is rather low and is broken by cliffs about 50 feet high with broad low-water beaches. **Kalaloch Rocks** are about 4.5 miles N of the river, close inshore.

A U.S. Navy Underwater Tracking Range is W of the mouth of Queets River, about 6 to 10 miles offshore. Underwater cables, several feet above the ocean bottom and over an area about 1 mile wide, extend NE from the upper E side of the tracking range, at about 47°32.5'N., 124°30'W., to the shore at about 47°36.3'N., 124°22.5'W. Mariners are cautioned against anchoring or dragging in these areas.

Destruction Island, 90 feet high, is 20 miles NNW of Cape Elizabeth and 3 miles offshore. It is flat-topped and covered with brush, with a few clumps of trees. The island is 0.5 mile long and 300 yards wide at its S part. From the N end rocks and ledges extend about a mile from the cliffs; these are bordered by a line of kelp on the inshore side.

Destruction Island Light (47°40.5'N., 124°29.1'W.), 147 feet above the water, is shown from a 94-foot white conical tower with black gallery on the SW part of the island; a fog signal is at the light.

An indifferent anchorage, affording shelter from NW winds, may be had off the SE face of the island in 10 fathoms, sandy bottom, with the light bearing between **293°** and **315°**. Vessels must leave if the wind hauls W or S. During the fishing season many small fishing boats anchor for the night under Destruction Island; it is the only shelter from offshore winds between Grays Harbor and Cape Flattery.

Chart 18480.–For 5.5 miles from Destruction Island to Hoh Head, the coast trends in a general NW direction. The cliffs are 50 to 100 feet high, and many rocks and ledges extend 1.2 miles offshore in some places.

Abbey Islet, 3.5 miles NE of Destruction Island, is over 100 feet high and covered with trees. It is 200 yards off the cliffs. Many rocks are close S of it, the most distant of which is **South Rock,** 46 feet high, 1 mile S, and 0.5 mile offshore.

At the mouth of **Hoh River,** 2 miles SE of Hoh Head, is a broad sand beach; the absence of cliffs for 0.5 mile is noticeable for a considerable distance offshore. In smooth weather the river can be entered by canoes, but the channel shifts. An Indian village is on the S bank at its mouth.

Hoh Head, 200 feet high, is a bright yellow cliff covered with a dense forest. It projects a little over 0.5 mile from the general trend of the coast. A large cluster of rocks is off the S cliff of the head and covered rocks extend to about 1.6 miles offshore between the head and North Rock. A rock covered 2¼ fathoms lies 1.8 miles WNW of Hoh Head.

Middle Rock, North Rock, and **Perkins Reef** are other dangers within 1.5 miles off Hoh Head. Middle Rock, 65 feet high and black with vertical sides, is 0.8 mile off the mouth of Hoh River. North Rock, a mile S of Hoh Head, is 107 feet high and grayish in color, with steep sides; in the afternoon sun this rock shows white, which makes it a very distinct landmark. Perkins Reef is a long, bold, and jagged islet, 1.1 miles W of Hoh Head. This area has numerous other rocks, covered and bare.

The coast continues rugged and rocky from Hoh Head to La Push, 11 miles to the NW. The cliffs are 100 to 120 feet high, broken here and there by small streams. Several rocky islets 25 to 120 feet high and covered ledges extend in some places as much as 2 miles offshore.

Alexander Island, 121 feet high, is 2 miles NNW of Hoh Head and a mile offshore. It is covered with low vegetation, and is flat-topped with steep sides. The island is prominent in hazy or smoky weather. A covered rock, 1.8 miles WNW of Alexander Island, is the outermost known danger in this vicinity.

Toleak Point, 4.7 miles NW of Hoh Head, is a narrow point terminating in a small knob with an abrupt seaward face. A high wooded islet lies 400 yards W of the point, to which it is connected by an extensive bare reef. **Rounded Islet,** a grassy rock 130 feet high with steep sides, is 0.3 mile seaward of Toleak Point. A low black rock is 0.7 mile S of the islet.

Giants Graveyard, 1.5 miles N of Toleak Point, consists of very irregular rocks; the largest are up to 210 feet high. The farthest offlying rock is about 0.8 mile from shore.

Teahwhit Head, 8 miles NW of Hoh Head and 2.4 miles SSE of La Push, is a jagged double point 100 feet high and heavily wooded. **Strawberry Bay,** on the SE side of the head, is a small bight in which fishing boats find shelter from NW winds. There are numerous rocks in and around the bight.

Quillayute Needle, 81 feet high, 1.3 miles WNW of Teahwhit Head, is the outermost of many rocks, visible or covered, that are within a mile of the shore. Some are as high as 100 to 195 feet, and many are awash or covered by a fathom or less. The foul area continues to James Island, at the entrance to La Push.

James Island, 15 miles NNW of Destruction Island on the N side of Quillayute River mouth, is 183 feet high, bold and wooded, and joined to the beach at low water. Numerous smaller wooded islands, immediately N, are prominent. An indifferent anchorage affording some shelter from NW winds may be had close SE of James Island, in 5 to 6 fathoms, sandy bottom, about 600 yards from the beach. Sea swell makes this anchorage unsafe.

James Island Light (47°54.3'N., 124°38.8'W.), 150 feet above the water, is shown from a white house on the S part of the island. A radiobeacon and fog signal are at the light.

La Push, an Indian village on the E bank and about 0.4 mile above the entrance of **Quillayute River,** is an important sport fishing center. The river channel is protected by a jetty on the SE side and a dike on the NW side; a lighted whistle buoy is about 1.8 miles SW from the outer end of the jetty.

COLREGS Demarcation Lines.–The lines established for the Quillayute River are described in 80.1380, chapter 2.

The river channel leads from the sea to a small-craft basin at La Push. The entrance channel is marked by a directional light. In April-May 1976, the controlling depths were 5½ feet to just off the Coast Guard boathouse about 0.4 mile above the mouth, thence in March 1980, 8 feet to the entrance to the basin; depths of about 10 feet were reported available in the basin in 1973. In March 1980, severe shoaling was reported on the SE side of the river entrance; mariners are advised to use extreme caution in the area. The N and S sides of the entrance to the basin are marked by lights. A power cable with a clearance of about 100 feet crosses the river near its mouth.

The channel, which passes close to the SE shore of James Island, is sometimes dangerous, especially in heavy S weather. Weather conditions which make the entrance hazardous normally occur only in the winters, usually in December and January. When there are breakers of any size making across the entrance, it should not be attempted except at better than half tide and with a well-powered boat. Strangers may request assistance from the La Push Coast Guard station by radio or signals; a Coast Guard boat will lead the vessel in if practicable. The tank at the Coast Guard station is prominent.

Storm warning signals are displayed. (See chart.)

Weather.–Maritime air from over the Pacific has an influence on the climate throughout the year. In the late fall and winter, the low-pressure center in the Gulf of Alaska intensifies and is of major importance in controlling weather systems entering the Pacific Northwest. At this season of the year, storm systems crossing the Pacific follow a more S path striking the coast at frequent intervals. The prevailing flow of air is from the SW and W. Air reaching this area is moist and near the temperature of the ocean water along the coast which ranges from 45° F in February to 57° F in August. The wet season begins in late September to October. From October through January, rain may be expected on about 26 days per month; from February through March, on 20 days; from April to June, on 15 days; and from July to September, on 10 days. As the weather systems move inland, rainfall is usually of moderate intensity and continuous, rather than heavy downpours for brief periods. Gale force winds are not unusual. Most of the winter precipitation over the coastal plains falls as rain; however, snow can be expected each year. Snow is seldom deeper than 10 inches or remains on the ground longer than 2 weeks. Annual precipitation increases from about 90 inches near the coast, to more than 120 inches over the coastal plains, to 200 inches or more on the wettest slopes of the Olympic Mountains.

During the rainy season, temperatures show little diurnal or day to day change. Maximums are in the forties or minimums in the midthirties. A few brief outbreaks of cold air from the interior of Canada can be expected each winter. Clear, dry, cold weather generally prevails during periods of E winds. Maximum temperatures range from 25°F to 35°F and minimums from 10°F to 25°F.

In the late spring and summer, a clockwise circulation of air around the large high-pressure center over the North Pacific brings a prevailing NW and W flow of cool, comparatively dry, stable air into the NW Olympic Peninsula. The dry season begins in May with the driest period between mid-July and mid-August. The total rainfall for July is less than 0.5 of an inch in 1 summer out of 10; also, it exceeds 5.0 inches in 1 summer out of 10. During the warmest months, afternoon temperatures are in the upper sixties and lower seventies, reaching the upper seventies and the lower eighties on a few days. Occasionally, hot, dry air from the E of the Cascade Mountains reaches this area and maximum temperatures are in the mid-or upper-nineties for 1 to 3 days. Minimum temperatures are in the upper forties and the lower fifties. The lowest relative humidity and greatest danger of forest fires occur with E winds.

In summer and early fall, fog or low clouds form over the ocean and frequently move inland at night, but generally disappear by midday. In winter, under the influence of a surface high-pressure system, centered off the coast, fog, low clouds, and drizzle occur daily as long as this type of pressure pattern continues. The average frost-free season is from the last of April until mid-October.

The National Weather Service maintains an office at the Quillayute Airport about 3 miles inland from the coast; **barometers** may be compared here. (See page T-9 for Quillayute **climatological table.**)

The Coast Guard has established a **rough bar advisory sign,** 34 feet above the water, visible from the channel looking seaward, on the NW corner of the Coast Guard boathouse, to promote safety for small-boat operators. The sign is diamond shaped, painted white with an international orange border, and with the words "Rough Bar" in black letters. The sign is equipped with two alternating flashing amber lights. The lights will be activated when seas exceed 4 feet in height and are considered hazardous for small boats. Boatmen are cautioned, however, that if the lights are not flashing, it is no guarantee that sea conditions are favorable.

About 350 berths, electricity, gasoline, diesel fuel, water, ice, a launching ramp, and some marine supplies are available at the basin at La Push. A 3-ton hoist can handle craft to 24 feet; however, no repairs can be made at the basin. A good highway connects La Push with U. S. Highway 101 N of Forks.

From James Island NNW for 16.4 miles to Cape Alava, the rugged coast continues, with rocks and foul ground extending as much as 2 miles offshore; the land side consists of steep wooded bluffs and narrow beaches. The cliffs, however, are not continuous. The once densely timbered country ascends gradually E to the snow-capped mountains of the Olympic Range, which can be seen for many miles in clear weather. In 1974, areas of heavy logging activity were in evidence inland for many miles from this coastal area.

Cake Rock, 116 feet high, is 2 miles NW of James Island and 1.5 miles offshore. This rock, about 200 yards long, has steep sides and its flat top is surmounted by a 20-foot mound. There are several other visible rocks between Cake Rock and the shore.

Cape Johnson, small and not particularly prominent, projects less than 0.5 mile from the coastline, terminating in a vertical cliff 100 feet high.

Sea Lion Rock, 78 feet high, 2.6 miles NW of Cape Johnson, is large, brown, covered with guano, and irregular in outline. A low black rock lies 200 yards N of **Carroll Island,** 225 feet high, and is 0.8 mile N of Sea Lion Rock. It has vertical whitish sides and a wooded top. A pillar rock, 134 feet high, lies 200 yards W, and a low black rock is 200 yards off the SE side. Carroll Island and the pillar rock are quite prominent, especially in the sunlight.

Jagged Island is the larger of two high bare rocks, inside of Sea Lion Rock and Carroll Island, about 0.8 mile offshore. It is 320 feet high with steep sides. The smaller rock is 183 feet high. They are 200 yards apart, and between them are two pinnacle rocks close together. Many other rocks are shoreward of the island.

Hand Rock, 33 feet high, is 1.5 miles N of Carroll Island and 1.5 miles offshore. So named from its shape, the rock is black with a white cap of guano on top.

White Rock, 161 feet high, 1.7 miles S of Cape Alava and about 0.8 mile offshore, has nearly vertical sides and a rounded top; it is whitish, and in the sunlight is visible for a long distance. A group of large, low, black rocks lie 0.8 mile SSE of White Rock and 0.8 mile offshore. A rock covered 6 fathoms is 2.2 miles W of White Rock.

Charts 18485, 18460.–Cape Alava, the westernmost point of the State of Washington, is 13 miles S of Cape Flattery. The seaward face is about 0.6 mile in extent. **Tskawahyah Island,** a steep rocky island, 142 feet high and with trees on top, is off its NW extremity. The shore is bordered by numerous rocks and covered ledges.

The several fixed lights along this otherwise remote stretch of shoreline are associated with the year-round operation of the Ozette Archaeological Expedition which was established at an abandoned Indian village site on Cape Alava in 1970.

Flattery Rocks and Umatilla Reef are rocks and islets extending W from Cape Alava for 2.3 miles. **Ozette Island,** 236 feet high, is 0.8 mile SW of the cape. The island, 0.5 mile long, is flat-topped with steep sides. About 0.3 mile off the S and SE sides are low, black rocks. **Bodelteh Islands,** 1.2 miles WNW of the N end of Cape Alava, have high bold seaward faces. The outer one is 198 feet high.

In season, a few fishermen find shelter in an anchorage off the SE end of Ozette Island. The area is small and requires local knowledge to enter. It affords fair protection from the prevailing NW wind.

Umatilla Reef, 2.3 miles NW of Cape Alava, the greatest danger to navigation off this section of the coast, is 0.7 mile W of the outer Bodelteh Island. It extends for 200 yards in a W direction and is about 75 yards wide. The reef consists of small, low, black rocks and some breakers. There is a reported breaker 1.1 miles NNE of this reef, and a rock covered 3 feet, 0.3 mile E of the reef, which endangers the passage inside Umatilla Reef, sometimes used by small boats. Umatilla Reef is difficult to make out, especially in thick weather. A lighted whistle buoy is about 1.5 miles W of the reef.

Between Cape Alava and Cape Flattery, the coast curves slightly in a series of bights, but continues as rugged as before. There are alternate stretches of wooded bluffs and high rocky cliffs. The country immediately back of the beach is not high, but it is densely wooded.

Point of Arches, 5 miles NNE of Cape Alava, is the N point of the cliffs that extend some 1.5 miles S. Numerous rocks and ledges are offshore as far as about a mile.

Father and Son, two rocks connected by a low reef, lie 0.6 mile offshore abreast the S end of the cliffs. The outer rock is 167 feet high, and the inner one 65 feet high. From the outer rock to Spike Rock there are several exposed rocks.

Spike Rock, 35 feet high, sharp and bare, is 0.8 mile NW of the Point of Arches. It is the outermost of a chain of rocks, the largest of which is 185 feet high; there are three arches in these rocks. A rock that uncovers 5 feet is 0.3 mile WSW of Spike Rock.

Portage Head, 2.5 miles N of Point of Arches, has a mile-long seaward face of bold irregular cliffs over 410 feet high. **Anderson Point,** at the N end of the cliffs, has a height of about 270 feet. A reef extends from the point toward Cape Flattery for 1.5 miles showing several low, black rocks awash, and one small rock 45 feet high. A rock that uncovers is 1.3 miles NW of Portage Head.

Makah Bay is a shallow bight included between Portage Head and Waatch Point. It affords indifferent shelter in N and E weather and a smooth sea, but is little used. During salmon runs many native pulling boats beach here at night. The shores are low and sandy. **Waatch River** enters in the N part of the bight immediately E of Waatch Point. It is a tidal slough, and the valley through which it runs extends about 2 miles to Neah Bay on the Strait of Juan de Fuca. This low depression is one of the features for recognizing Cape Flattery.

Waatch Point, 3 miles SE of Cape Flattery, is the SE extremity of the cliffs extending to the cape. This stretch is bordered by numerous rocks and ledges.

Fuca Pillar, 0.2 mile S of the W point of Cape Flattery, is a rocky column 157 feet high and 60 feet in diameter, leaning slightly NW. It is 150 yards off the face of the cliff, and is more prominent from N than from S.

Cape Flattery, a bold, rocky head with cliffs 120 feet high, rises to nearly 1,500 feet about 2 miles back from the beach. From S it looks like an island because of the low land in the valley of Waatch River. Numerous rocks and reefs border the cliffs E and S of the cape. Tide rips are particularly heavy off Cape Flattery.

A large radar dome, highest and most prominent structure in the area, is on **Bahokus Peak,** the part of Cape Flattery about 2 miles back from the beach that rises to nearly 1,500 feet. This inflated plastic dome, about 50 feet in diameter, is on top of a tower, and was reported to be a very good landmark over low dense fog for vessels coming from the S.

Tatoosh Island, 0.4 mile NW of Cape Flattery, is about 0.2 mile in diameter, 108 feet high, flat-topped, and bare. It is the largest of the group of rocks and reefs making out about 0.9 mile NW from the cape. The passage between Tatoosh Island and the cape is dangerous and constricted by two rocks awash near its center. Although sometimes used by local small craft, it cannot be recommended. The currents are strong and treacherous.

(See page T-9 for **Tatoosh Island climatological table.**)

Cape Flattery Light (48°23.5'N., 124°44.1'W.), 165 feet above the water, is shown from a 65-foot white conical tower on a sandstone dwelling on the W end of Tatoosh Island. A radiobeacon and fog signal are at the light.

A rocky patch, covered 7½ fathoms, on which the sea breaks occasionally in a W swell, is 1.4 miles SW of the light.

Duncan Rock and **Duntze Rock,** the two principal dangers NNW of Tatoosh Island, are respectively, 1 mile and 1.3 miles from the light. Duncan Rock is small, low, and black; Duntze Rock is covered 3¾ fathoms. A lighted whistle buoy is 500 yards NW of Duntze Rock. Ledges and rocks constrict the passage between Duncan Rock and Tatoosh Island to less than 0.5 mile, and strong currents and tide rips make it hazardous.

Charts 18460, 18480.–Swiftsure Bank, about 3.5 miles in extent, is off the mouth of the Strait of Juan de Fuca, NW of the submarine valley making into the strait. The bank has a least depth of 18 fathoms.

During the summer, large numbers of fishing vessels may be trolling or at anchor on Swiftsure Bank. During periods of low visibility, which are not uncommon in this vicinity, extreme caution must be exercised to avoid collision with fishing boats; most of these craft tend to defy radar detection.

U.S. Navy operating areas are SW of the entrance to the Strait of Juan de Fuca. Mariners should exercise caution when navigating in this vicinity while exercises are in progress.

Carmanah Point to Amphitrite Point, Canada.– The coast from Carmanah Point to Cape Beale is very dangerous and, except during fine weather and offshore winds, should be given a wide berth.

Carmanah Point is on the Vancouver Island shore, 13 miles N of Tatoosh Island. A light, 175 feet above the water, is shown from a white octagonal concrete tower on the point; a fog signal and radiobeacon are at the light.

Clo-oose, an abandoned village, is 4 miles NW of Carmanah Point in the small cove at the mouth of the Cheewhat River, E of the entrance to Nitinat Lake.

A reef 0.8 mile long in a NW direction, with a rock awash in its center, is off this cove. It is marked by a lighted whistle buoy 0.8 mile SW of the rock.

Tsusiat Lake is 8.5 miles NW of Carmanah Light. At the seaward end of the lake is a conspicuous waterfall which is visible far off even in hazy weather, and may help fix a vessel's position as it is the only waterfall on this part of the coast. Behind Tsusiat Lake the mountains rise to more than 2,000 feet.

Pachena Point, 25 miles NW of Cape Flattery, is marked by a light; a fog signal is at the light.

Seabird Rocks are off the entrance to Pachena Bay, 3 miles NW of Pachena Point. The largest is about 48 feet high, bare, and of small extent; it is marked by a light. There is no safe passage between Seabird Rocks and the shores NE, and the rocks should not be approached closer than 1.5 miles.

Cape Beale is a bold rocky point, 120 feet high. A reef with rocks above and below water extends about 0.8 mile SW from it. A light, 170 feet above the water, is shown from a white slatted daymark on a red square skeleton tower near the W extremity of the cape; a fog signal and a marker radiobeacon are at the light.

Barkley Sound, an extensive arm of the sea 35 miles NW of Cape Flattery, lies between Cape Beale and Amphitrite Point. It is 15 miles wide at its entrance, and though encumbered by numerous islands and rocks, it maintains a breadth of 13 miles for 8 miles inland, above which it separates into several narrow inlets. The shores are low, except in the N part and among the inlets, where they become high, rugged, and mountainous.

In the W part of the sound are innumerable rocks and islands with navigable channels between them. Entrance should not be attempted without local knowledge or a pilot. **Imperial Eagle Channel** is the easiest of access.

Amphitrite Point is the W entrance point of Barkley Sound. A light, 50 feet above the water, is shown from a white rectangular tower on the end of the point; a fog signal is at the light. A radiobeacon is about 0.2 mile N of the light. A whistle buoy is 0.6 mile S of the point.

A more detailed description of Canadian waters is given in Pub. No. 154, Sailing Directions (Enroute) for British Columbia, published by the Defense Mapping Agency Hydrographic/Topographic Center, and the Sailing Directions, British Columbia Coast, (South Portion) Vol. I, published by the Canadian Hydrographic Service.

Routes.–In clear weather no difficulty will be experienced in approaching the entrance to the Strait of Juan de Fuca from any direction, as the land on both sides is high and Cape Flattery is readily distinguished, particularly from S, owing to the low land between Makah and Neah Bays. Lights, fog signals, and radiobeacons are available on both sides of the strait to assist in obtaining a fix.

In thick weather soundings will assist in estimating the distance from shore. Vessels should pick up the 100-fathom curve and be guided by the soundings. The relationship between the 100-and 50-fathom curve is a good indication for fixing the position; vessels should not proceed inside the 50-fathom curve until a fix has been obtained. The mountain peaks in the interior sometimes can be seen when the coast is obscured by fog.

Depths.–The depths in the approaches to the Strait of Juan de Fuca are very irregular, especially outside the 50-fathom curve. There is a deep submarine valley with depths of over 100 fathoms and a width of 2 to 4 miles, between the 100-fathom curves, which leads from about 37 miles SSW of Cape Flattery, rounds this cape at a distance of 2 miles, and extends about 32 miles into the strait. The 100-fathom curve on the W side of this submarine valley is very irregular, but on the E side it is more regular. Within the strait the curve is regular on both sides of the valley.

Currents.–The currents on Swiftsure Bank and at Umatilla Reef are described in the Tidal Current Tables. Off the entrance of the Strait of Juan de Fuca the coastal current is influenced by the flow into and out of the strait. On the flood there is a set into all the sounds on the Vancouver Island shore, and this, combined with the prevailing NW current and light S winds, with possibly some swell from the same direction, makes the coast in the vicinity and W of Carmanah Light dangerous, especially for small vessels. Many strandings have occurred on the Vancouver Island shore.

The flood current entering the Strait of Juan de Fuca sets with considerable velocity over Duncan and Duntze Rocks, but instead of running in the direction of the channel there is a continued set toward the Vancouver Island shore, which is experienced as far as Race Rocks. The flood current also has more velocity on the N shore of the strait than on the S.

The ebb current is felt most along the S shore of the strait, and between New Dungeness Light and Crescent Bay there is a decided set S and W, especially during large tides. With wind and swell against the current, a short choppy sea is raised near the entrance to the strait. (For additional information on currents in the Strait of Juan de Fuca, see chapter 12.)

Sailing craft approaching the strait should keep well off the mainland coast S of Cape Flattery, unless working to windward against a fine N wind, which is frequently found during the summer. In this case the coast may be approached to within 3 miles. At other times there is no inducement to hug the coast, on which a long rolling swell frequently sets, and this swell, meeting the SE gales of winter, causes a confused sea. The cape and its offlying dangers should be given a berth of at least 3 miles, as the tidal current sometimes sets with great velocity toward Duncan and Duntze Rocks. It is equally necessary when entering or leaving the strait to avoid the coast of Vancouver Island between Port San Juan and Bonilla Point, when there is any appearance of bad weather.

Sailing vessels making the strait during the winter, especially during November and December, and experiencing the E and SE winds prevalent at that season, should endeavor to hold a position S or SW of Cape Flattery, and should on no account open the entrance of the strait until an opportunity offers of getting well inside. It is also important to remember that, though it may be blowing strongly from the S or SSW outside, on rounding Cape Flattery, an E wind may be found blowing out of the strait, and a vessel would then find the Vancouver Island coast a dangerous lee shore.

Coming from the W with a heavy W or NW gale and thick weather, vessels uncertain of their positions should lie-to on soundings at not less than 30 miles from the entrance or on the edge of the bank. These gales seldom last more than 12 hours, and if they veer toward the SW the weather will clear and vessels may bear up for the strait.

Fog.–The fog is generally heavier near the entrance, decreasing in density and frequency up the strait. Near the entrance the fog sometimes stands like a wall, and vessels entering the strait run out of it into clear bright weather, even before passing Tatoosh Island. The fog frequently extends a long distance seaward. The wind gradually works the fog into the strait, and it will follow the N shore past Port San Juan to the Sombrio River; occasionally it will reach as far as Sooke Inlet and at times to Race Rocks. As a rule, however, the fog moves farther into the strait along the S shore, at times reaching Port Townsend; frequently the N shore is clear when the S shore is enveloped in fog.

During the spring, fog is frequent in the strait. With the W wind it often stops at the headland between Crescent and Freshwater Bays, the fog then extending W while it is clear to E. When fog extends past Freshwater Bay the small area about the W bight will often be clear.

Weather.–In summer, the prevailing NW winds draw into the strait, increasing toward evening and at times blowing a 10-knot breeze before midnight. This occurs, however, only when the winds are strong outside. In light winds, sailing vessels may be a week from Cape Flattery to Admiralty Inlet, and vice versa.

In winter, SE winds draw out of the strait, causing a confused cross-sea off the entrance, the heavy SW swell meeting that coming out. Under these conditions small outboard vessels, especially sail, often make Neah or Clallam Bays and await more favorable weather. The weather off the entrance as a rule is exceptionally severe, and wrecks are of frequent occurrence. The heavy broken seas are probably due to the shoaling off the entrance, the irregularity and velocity of the currents, and the conflict between the wind drawing out of the strait and that along the outer coast.

The rainfall in the vicinity of the entrance is considerable, even during the summer, although the heaviest rains occur between December and March.

12. STRAITS OF JUAN DE FUCA AND GEORGIA, WASHINGTON

Chart 18400.-This chapter includes the Strait of Juan de Fuca, Sequim Bay, Port Discovery, the San Juan Islands and its various passages and straits, Deception Pass, Fidalgo Island, Skagit and Similk Bays, Swinomish Channel, Fidalgo, Padilla, and Bellingham Bays, Lummi Bay, Semiahmoo Bay and Drayton Harbor, and the Strait of Georgia as far N as Burrard Inlet. The more important U.S. harbors described are Neah Bay, Port Angeles, Friday Harbor, La Connor, Anacortes, Bellingham, and Blaine Harbor. Deep-draft vessels use the harbors at Port Angeles, Anacortes, and Bellingham, the principal cities in the area. The Canadian coasts are only briefly described. (See Pub. 154, Sailing Directions (Enroute) for British Columbia, published by the Defense Mapping Agency Hydrographic/Topographic Center, and the Sailing Directions, British Columbia Coast, (South Portion) Vol. 1, published by the Canadian Hydrographic Service, for complete information on Canadian waters.)

Strait of Juan de Fuca separates the S shore of Vancouver Island, Canada, from the N coast of the State of Washington. The entrance to the strait lies between parallels 48°23'N., and 48°36'N., on the meridian of 124°45'W. This important body of water is the connecting channel between the ocean and the interisland passages extending S to Puget Sound and N to the inland waters of British Columbia and southeastern Alaska.

The commerce of this region is extensive, both foreign and domestic. Vast quantities of lumber, fish, grain, and general merchandise are exported, while the manufacturing and shipbuilding industries are important. Several transcontinental railroads have their terminals on Puget Sound. There are many steamer lines, foreign and domestic, operating from this area to places across the Pacific or through the Panama Canal, in addition to the coastal vessels.

At its entrance and for 50 miles E to Race Rocks, the strait is about 12 miles wide and then widens to about 16 miles for 30 miles E to Whidbey Island, its E boundary. The waters as a rule are deep until near the shore with few outlying dangers, most of which are in the E part. The shores on both sides are heavily wooded, rising rapidly to elevations of considerable height, and, except in a few places, are bold and rugged.

The navigation of these waters is relatively simple in clear weather. The aids to navigation are numerous. In thick weather, because of strong and irregular currents, extreme caution and vigilance must be exercised. Strangers should take a pilot.

The **Strait of Juan de Fuca Traffic Separation Scheme** and the Haro Strait and Strait of Georgia Traffic Separation Scheme, both voluntary systems, have been established by the U.S. Coast Guard and the Canadian Ministry of Transport. These schemes connect with each other and, although not a part of the mandatory **Puget Sound Vessel Traffic Service,** described later in this chapter, both schemes are connected to that service. Vessels so desiring, may while transiting the Strait, contact the Puget Sound Vessel Traffic Service by calling SEATTLE TRAFFIC on VHF-FM channel 14 (156.70 MHz) to receive desired information on known traffic, aids to navigation discrepancies, and locally hazardous weather conditions. Preliminary calls to SEATTLE TRAFFIC on VHF-FM channel 16 (156.80 MHz) are not required or desired.

Mariners should follow the "General Principles of Ships' Routing" as contained in the Inter-Governmental Maritime Consultative Organization (IMCO) publication "Ships Routing" (also published in Notice to Mariners No. 1 every year) when navigating in or near the traffic separation scheme in United States waters.

The Canadian Government recommends that ships conduct themselves in accordance with the navigational procedures set forth in the Ship Routing Regulations when navigating in or near the traffic separation scheme in Canadian waters. Mariners are advised that the Canadian Ship Routing Regulations are based upon the Inter-Governmental Maritime Consultative Organization's "General Principles of Ships' Routing", except for a relaxation that permits vessels engaged in fishing to proceed in any direction in or near traffic lanes and on the high seas.

Complete details of the traffic separation schemes and the vessel traffic management and information system for the coastal waters of Southern British Columbia are given in Pub. No. 152, Sailing Directions, Planning Guide for the North Pacific Ocean, published by the Defense Mapping Agency Hydrographic/Topographic Center, and Sailing Directions, British Columbia Coast (South Portion), Volume 1, published by the Canadian Hydrographic Service.

The **Traffic Separation Scheme (Strait of Juan de Fuca)** consists of **three approaches,** the **Main Approach,** the **Victoria Approach,** and the **Port Angeles Approach,** and two circular **precautionary areas,** one NNW of Cape Flattery and the other WNW of Port Angeles near Beechey Head. Each approach consists of **inbound** and **outbound traffic lanes** separated by **separation zones.** The center of each precautionary area is marked by a lighted orange and white horizontally striped buoy. The lighted buoy marking the center of the precautionary area NNW of Cape Flattery is equipped with a radar transponder beacon (Racon). (See Light List for additional information on Racons.)

The purpose of these buoys is to assist in the separation of inbound and outbound vessels transiting the Strait of Juan de Fuca to eliminate as much as possible the cross vessel traffic that now occurs between the entrance to the Strait of Juan de Fuca at Cape Flattery and the pilot stations at Port Angeles and Victoria, B.C. It is recommended that all vessels navigate so as to leave these buoys to port.

The **Haro Strait and Strait of Georgia Traffic Separation Scheme,** consisting of **inbound** and **outbound traffic lanes** separated by **separation zones,** continues E from the Victoria Approach segment of **Strait of Juan de Fuca Traffic Separation Scheme** to Victoria, B.C., thence through Haro Strait, Boundary Pass, and the Strait of Georgia, to Vancouver, B.C. Two abbreviated traffic separation schemes, also consisting of inbound and outbound traffic separation lanes, separated by separation zones, connect the Haro Strait and Strait of Georgia Scheme with the **Vessel Traffic Service (Puget Sound)** described later in this chapter. One leads NW from the precautionary area E of Hein Bank into Haro Strait, and the other leads NW from the precautionary area S of Alden Bank into the Strait of Georgia. These abbreviated schemes are voluntary.

Note: The above-mentioned schemes are shown on charts 18400, 18421 and 18465. The Scheme was last reconfigured on January 1, 1982. Complete details are contained in Local Notice to Mariners No. 49 (13th Coast Guard District) dated December 8, 1981.

Gill net fishing areas.–Regulations governing vessels transiting gill net fishing areas in U.S. waters E of Port Angeles and N of Seattle and in Hood Canal are given in **33 CFR 206.93** quoted below:

206.93 Puget Sound Area, Wash.; gill nets.

(a) Restricted fishing area. (1) The regulations in this paragraph shall govern fishing with gill nets within the waters of Puget Sound, Hood Canal, Possession Sound, Strait of Juan de Fuca, San Juan Archipelago, Georgia Strait, Rosario Strait, and adjacent waters north of latitude 47°39′42″ (passing through West Point Light), and east of longitude 123° 24′30″ (passing through Ediz Point Light); exclusive of the waters lying within the Tulalip, Swinomish, and Lummi Indian Reservations.

(2) A tug with tow, whose intended course will take it through waters occupied by gill net gear, shall sound one long blast, followed by one short blast, of a whistle or horn, and during darkness or fog shall, in addition, indicate its intended course by directing a searchlight beam on such course. Gill net fishermen operating within the indicated course of the tug shall draw in their gear or otherwise maneuver to permit passage of the tug and its tow without hindrance or unreasonable delay.

(3) A tug without tow or any other vessel, if unable to determine the lay of the nets and doubt exists aboard the tug or vessel as to the best course to take, may request assistance of the nearest gill net boat which shall, without delay, drop its net and pilot the tug or vessel through. If assistance of a pilot boat is not obtainable or if nets are so concentrated as to make it impracticable to lay a course through the nets, the tug or vessel shall proceed as indicated in paragraph (a)(2) of this section for a tug with tow, and nets shall be lifted or maneuvered out of the way to permit passage of the tug or vessel without hindrance or unreasonable delay.

(4) A boat with at least one man in it capable of controlling the net shall be in constant attendance upon each net while it is laid out, except when providing pilot service as provided in paragraph (a)(3) of this section.

(b) Prohibited fishing area in Possession Sound between Mukilteo and Columbia Beach. Fishing with gill nets is prohibited within 440 yards on each side of a straight line connecting the ferry landings at Mukilteo and Columbia Beach.

Caution.–Since logging is one of the main industries of the region, free-floating logs and submerged deadheads or sinkers are a constant source of danger in the Strait of Juan de Fuca and Puget Sound. The danger is increased during freshets. **Deadheads** or **sinkers** are logs which have become adrift from rafts or booms, have become waterlogged, and float in a vertical position with one end just awash, rising and falling with the tide.

COLREGS Demarcation Lines.–The line established for the Strait of Juan de Fuca, Haro Strait, and Strait of Georgia are described in 80.1385 and 80.1390, chapter 2.

A **Vessel Traffic Service (Puget Sound),** operated by the U.S. Coast Guard, has been established in the Strait of Juan de Fuca, E of Port Angeles, and in the waters of Rosario Strait, Admiralty Inlet, Puget Sound, and navigable waters adjacent to these areas. The System is designed to prevent collisions and groundings and to protect the navigable waters concerned from environmental harm resulting from such collisions and groundings.

The **Puget Sound Vessel Traffic Service** comprises two major components: a **Traffic Separation Scheme** and a **Vessel Movement Reporting System.** The Traffic Separation Scheme comprises a network of one-way traffic lanes, separation zones in between, and precautionary areas. The traffic lanes are each 1,000 yards wide and are separated by 500-yard-wide separation zones.

The Vessel Movement Reporting System is based upon a VHF-FM communications network maintained continuously by the Coast Guard Vessel Traffic Center in Seattle. This center will process information received from vessels in required and voluntary reports, and will, in turn, disseminate navigational safety information to vessels participating in the service. The mariner is cautioned that information provided by the vessel traffic center is, to a large extent, generated from these reports by vessels and can be no more accurate than that received. Additionally, the Coast Guard may not have first-hand knowledge of hazardous circumstances existing in the Vessel Traffic Service Area, and unreported hazards may confront the mariner at any time. The Vessel Traffic Service is shown on the appropriate nautical charts of the area.

The rules governing vessels operating in the Vessel Traffic Service are given in **161.101** through **161.189**, chapter 2. In addition, the proper operating procedures are contained in the Puget Sound Vessel Traffic Service Operating Manual, available at no charge from Commanding Officer, U.S. Coast Guard, Puget Sound Vessel Traffic Service, 1519 Alaskan Way S., Seattle, Wash. 98134.

Currents, Cape Flattery to Race Rocks.–The currents may attain velocities of 2 to 4 knots, varying with the range of tide, and are influenced by strong winds. E of Race Rocks, in the wider portion of the strait, the velocity is considerably less. At Race Rocks and Discovery Island the velocity may be 6 knots or more.

The **flood current** entering the Strait of Juan de Fuca sets with considerable velocity over Duncan and Duntze Rocks, but, instead of running in the direction of the channel, it has a continued set toward the Vancouver Island shore which is experienced as far as Race Rocks. The flood current velocity is greater on the N shore of the strait than on the S.

The **ebb current** is felt most along the S shore of the strait, and between New Dungeness Light and Crescent Bay there is a decided set S and W, especially during large tides. With the wind and swell against the current, a short choppy sea is raised near the entrance to the strait.

The current movement is complicated by a large daily inequality. The Tidal Current Tables should be consulted for times and velocities.

Tide rips occur off the prominent points and in the vicinity of the banks. These are particularly heavy off Cape Flattery, Race Rocks, Dungeness Spit, and Point Wilson, at times becoming dangerous to small vessels.

Winds and visibility.–Winds are strongest from October through March. This results from the numerous winter storms that move through these waters; this is also an area where storms tend to intensify. As low-pressure systems approach the coast, winds strengthen and back to the SE quadrant, sometimes reaching gale force. After the storm passes, winds veer to the SW or NW. Gales usually last less than 1 day whereas the interval between storms normally varies from 1 to 5 days or up to 2 weeks when a strong high-pressure system settles in. These systems can also present local wind problems in the Georgia Strait. The mountainous terrain of this region plays an important part in determining the direction and speed of the wind. There are normally two wind seasons–winter lasts from October through March, while a summer regime covers the other 6 months.

From October through March, winds at the Pacific entrance to the Strait of Juan de Fuca blow mostly out of the SE through SW. Gales blow on 4 to 6 days per month. They can come from any direction, however, SE winds are consistently the strongest, averaging about 18 knots. Strong SE winds raise dangerous confused seas off Cape Flattery, when they meet the long, rolling SW swells that frequent these waters. The frequent strong winds from a S quarter make the Vancouver coast between Cape Cook and Port San Juan a dangerous lee shore. When gales blow from the SW through W, it is usually safer inside the Strait than out. In general, winds are strongest and gales more frequent in the W end of the Strait. In the open water of the middle of the Strait, winter winds blow mostly out of the E through SE. Gales occur on about 2 to 4 days per month in the E half. The S shore is protected from the SE gales; Port Angeles provides good shelter. An approaching storm often sets up strong E winds in the central part of the Strait. This, in turn, sets up a drainage of air from the Georgia Strait, so that winds near the E entrance are frequently from the N through NE. As the storm moves inland, it produces a reversal of this flow. Winds blow from the W through most of the strait, backing to the SW in the E. Winds near the W entrance have reached 65 knots with gusts to 90 knots. In the strait, 50-knot winds and 80-knot gusts have been reported.

Summer winds at sea blow mainly from the SW through NW around the subtropical Pacific high. Heating of the North American continent helps draw air into the Strait of Juan de Fuca. This sea breeze reinforces the prevailing flow and results in daytime winds up to 15 knots. The land breeze opposes the normal flow, and calms are often the rule at night. SW through W winds are most frequent in the Strait of Juan de Fuca.

In few parts of the world is the vigilance of the mariner more called upon than when entering the Strait of Juan de Fuca from the Pacific in fog. Sea fog is the most common type, and it is at its worst from about July through October. Local land fog extends the visibility hazard into the winter. Fog is most frequent at the W end of the Strait. Here, visibilities drop to less than 0.75 mile on about 55 days annually, compared to about 35 days in the E end. Dense fog sometimes hangs over the ocean entrance to the Strait for days at a time; this is most likely during calms or light breezes. It gives the appearance of a wall, and ships entering often run into clear, bright weather before they pass Tatoosh Island. Often the fog is carried E on the W sea breeze. When this happens, the fog usually penetrates farther E along the S shore. It is much more likely to reach Port Angeles or Port Townsend than Victoria. In spring, the E penetration of an infrequent fog is usually limited to Crescent or Freshwater Bays. Often when thick weather prevails in the Strait of Juan de Fuca, skies are clear N of Race Rocks.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Port Angeles has been designated as the pilotage station for all vessels enroute to or from the sea. Pilotage for Puget Sound and adjacent inland waters is provided by the **Puget Sound Pilots** and the **Washington Pilots Association.**

Vessels desiring a pilot should proceed to a point about 0.5 mile E of Ediz Hook where the pilot will board the vessel. Should a NW wind, sea, and swell exist, vessels should proceed to a position inside and S of Ediz Hook, so as to provide a lee and to facilitate boarding. In clear weather vessels should indicate their desire for a pilot by hoisting the International Code flag "G" and blow the whistle signal of one long, one short, and one long. In fog or thick weather the blowing of the signal will attract the attention of the pilot stations, and repetition of the signal will assist the pilot boat in locating the vessel.

The Puget Sound Pilots' pilot station is about 0.7 mile W of Ediz Hook Light. This organization has two pilot boats, JUAN DE FUCA, 53 feet long, and PUGET SOUND, 50 feet long. Each boat has a white hull and an orange house. Pilotage should be arranged in advance with the pilot station by telephone (206-624-2212) or through radio station KOB, Everett, Wash. The pilot station and the pilot boat guard VHF-FM channels 13 (156.65 MHz) and 14 (156.70 MHz), with channel 9 (156.45 MHz) as a working frequency. Puget Sound Pilots request vessels to rig the pilot ladder on the leeward side about 3 feet above the water.

At night the pilot station will show from a mast three vertical lights, the highest and lowest red and the middle one green, to indicate the pilot boat is en route to the vessel. The pilot station is equipped with radar to locate and track vessels, and to direct the pilot to ships during periods of low visibility.

The Washington Pilots Association's office is at the Port Dock Building, Port Angeles. Their boat, TRACI-JO, is 50 feet long with a blue hull and an orange house with the word PILOT on each side of the house. Pilotage should be arranged in advance with the pilot office by telephone (206-285-2655) or through radio station KLB, Seattle, Wash. The pilot office and the pilot boat guard VHF-FM channels 13 (156.65 MHz) and 16 (156.80 MHz), with channels 9 and 13 as working frequencies. Washington Pilots Association requests vessels rig the pilot ladder 3 feet above the water on the starboard side.

To ensure prompt service the appropriate association should be provided with the vessel's estimated time of arrival (ETA) at the pilot pickup point, 24 hours in advance. An amended ETA should be provided if subsequent conditions necessitate changing the original one. In any event, an inbound vessel should reaffirm its ETA at the pilot pickup point when it passes Cape Flattery.

In an emergency, a vessel may call the U.S. Coast Guard station on Ediz Hook, call letters NOW, on 2182 kHz, which will forward the message to the appropriate pilot organization.

Both organizations request that vessels maintain a speed of 6 to 8 knots when the pilot boat comes alongside.

Pilotage, British Columbia Coast.–Pilotage on the British Columbia coast is under the jurisdiction of the Pacific Pilotage Authority, a Crown Corporation established under the provisions of the "Pilotage Act" to operate, maintain and administer in the interests of safety an efficient pilotage service on the W coast of Canada. The pilotage region of the Authority consists of all Canadian waters in and around the Province of British Columbia and these waters are divided into the following five areas:

Area 1–All the waters of the Fraser River.

Area 2–All Canadian waters between Vancouver Island and the mainland.

Area 3–All waters on the W coast of Vancouver Island.

Area 4–All Canadian waters on the mainland N of Vancouver Island.

Area 5–All waters in and around the Queen Charlotte Islands.

Pilotage for the waters of the regions as described above is compulsory for all vessels of 350 gross tons or more including tugs with tows where the combined gross registered tonnage is 350 tons or more. Only licensed pilots may be employed.

Pilot boarding stations are established at the following locations:

(a) At fairway buoy off Brotchie Ledge near Victoria.

(b) Off Cape Beale, at the entrance to Trevor Channel in Barkley Sound.

(c) Off Triple Island near Prince Rupert.

Vessels bound for British Columbia ports or proceeding through British Columbia coastal waters via the Inside Passage should obtain pilots at the foregoing boarding stations.

The master, owner or agent of a ship that is to arrive in a compulsory pilotage area shall notify the Authority of pilot requirements at the boarding stations, as follows:

(a) At fairway buoy, off Brotchie Ledge near Victoria, at least 12 hours prior to arrival and shall confirm or correct the ETA 4 hours prior to arrival.

(b) Off Cape Beale, at the entrance to Trevor Channel in Barkley Sound, at least 48 hours prior to arrival and shall confirm or correct the ETA 12 hours prior to arrival.

(c) Off Triple Island near Prince Rupert, at least 48 hours prior to arrival and shall confirm or correct the ETA 12 hours prior to arrival.

Radio messages from ships requiring pilots shall be addressed to "Pilots Victoria" and shall be sent via any Canadian Coast Guard radio station by radiotelegraph or radiotelephone.

Pilotage messages must include:

(a) the pilotage service to be performed and,

(b) the name, nationality, length, breadth and gross tons of the ship.

Should rough weather at Cape Beale or Triple Island prevent a pilot from boarding, the vessel should follow the pilot boat into more sheltered waters where embarkation is more practical.

In clear weather vessels should indicate their request for a pilot, by day, by hoisting the International Code Flag "G"; and by night by a signal of four long flashes on their signal lamp. In fog or thick weather, vessels should make a whistle signal of four long blasts. The repetition of this signal will help the pilot to locate the vessel.

The Authority's pilot launches do not cruise on station but leave the pilot station ashore, subject to a vessel's ETA, in ample time to meet her at the boarding station.

The attention of mariners is directed to Rule 35(i) of the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS), which reads:

"A pilot vessel when engaged on pilotage duty may in addition to the signals prescribed in paragraphs (a), (b) or (f) of this Rule sound an identity signal consisting of four short blasts."

Mariners are advised that pilot vessels on the coasts of Canada adhere to the above rule for sound signals.

The pilot station at Victoria is equipped with VHF-FM radiotelephone and maintains a 24-hour watch on channel 16 (156.80 MHz). All the Authority's pilot launches in the region are similarly equipped and may be contacted on the same frequency.

U.S. flag tugs with tows where the combined tonnage is 350 gross registered tons or more, may be granted a waiver from compulsory pilotage by the Pacific Pilotage Authority, provided the master and at least one deck watch officer hold appropriate U.S. Coast Guard licenses and have been regularly employed in the waters of the Inside Passage of British Columbia during the preceding 18 months. Applications for waivers should be made to the Pacific Pilotage Authority giving the name, port of registry and owner of the tug, the names of the master and deck watch officer or officers together with their United States Coast Guard license numbers and dates of issue, and confirmation of their experience in the Inside Waters, in sufficient time to allow for processing and may be made verbally or in writing. In emergency cases, application for a waiver may be made by radiotelephone by contacting the Victoria pilot station. Where waivers are not issued, such tugs and tows will require two pilots while transiting the Inside Passage.

The tariff of pilotage rates, and further details of pilotage in British Columbia may be obtained on application to the Pacific Pilotage Authority, Room 605, 1200 West Pender Street, Vancouver, B.C.

Towage.–Tugs are stationed at Port Angeles. Arrangements are usually made in advance through ships' agents.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine.–Quarantine at U.S. ports is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

In British Columbia, the quarantine boarding station is in the vicinity of the Fairway Lighted Whistle Buoy S of Victoria Harbor in 48°22.8'N., 123°24.9'W. The Victoria quarantine station is the only port at which pratique may be granted. Every vessel arriving from a port outside Canada must be inspected at the Victoria quarantine boarding station or be granted pratique before making customs entry at any Canadian port.

The Victoria station is under the charge of a quarantine medical officer. A collector of customs shall act in the capacity of a quarantine officer at an unorganized port of arrival.

Vessels desiring pratique should inform Quarantine Victoria by radio between the hours of 0900 and 1700 at least 24 hours prior to their estimated time of arrival at the boarding station. Any vessel which has not received radio pratique and is bound for a port in British Columbia shall, on approaching a port, display as a quarantine signal a yellow flag at the fore by day, and a red light over a white light at the fore by night; the quarantine signal shall not be removed until the vessel has been inspected and released by the quarantine officer.

Issuance of duplicate pratique between Canada and the United States is no longer applicable.

Charts 18480, 18460.–Strait of Juan de Fuca, N shore (Canada).–Carmanah Point is described in the previous chapter. **Bonilla Point,** the N entrance point at the W end of the strait, is about 1.8 miles ESE from Carmanah Light. Inland of Bonilla Point, which slopes gradually to the sea, the mountains attain heights of over 3,500 feet and are heavily wooded. A reef extends 0.5 mile off the point, and the shores should be given a berth of at least 1.5 miles.

From Bonilla Point the coast trends in a SE direction for 9.5 miles to Owen Point. It is nearly straight, rocky, and bluff, with high mountains rising immediately behind it; all are heavily wooded.

Port San Juan offers the first anchorage on the N shore within the entrance to the Strait of Juan de Fuca. The port is conspicuous from seaward, appearing as a deep gap between two mountain ranges.

The entrance between **Owen Point** and **San Juan Point,** 1.7 miles wide and 3.5 miles long, is 13 miles NE of Cape Flattery Light. It is marked by a lighted whistle buoy. San Juan Point is marked by a light and fog signal.

The port is open to SW winds, and a heavy sea rolls in when a moderate gale is blowing from that direction. Though it is possible that a vessel with good ground tackle could ride out a gale if anchored in the most sheltered part, it is recommended that with any indication of SW gales a vessel should weigh anchor immediately and, if the vessel's draft is 16 feet or less, seek shelter in Neah Bay; vessels of deeper draft should proceed to Port Angeles.

Anchorage may be had in 6 to 9 fathoms anywhere in Port San Juan; a good position is in 5½ fathoms about 1 mile from the beach at the head of the port.

Cerantes Rocks, about 300 yards SW from San Juan Point, include several high pinnacle rocks with a few trees growing on them. About 800 yards N of these rocks and 300 yards from shore is another reef partly uncovered.

Port Renfrew is a settlement on the SE side of Port San Juan, about 2 miles NE of San Juan Point. A T-head pier has depths of 15 feet alongside.

From Port San Juan the coast trends SE for 23.5 miles to Sheringham Point. This stretch of coast presents no prominent features. The country is thickly wooded, and the land rises to a considerable elevation. The points, some of which are bare on their extremities, are not prominent nor are they easily identified, except from close inshore.

A Canadian Armed Forces **firing** and **practice exercise area** is established in the vicinity of Sheringham Point and San Simon Point about 8 miles to the W. (See Annual Edition of Canadian Notices to Mariners for area limits, types of practices, warning signals, etc.)

Between Port San Juan and Race Rocks, fish traps and broken piles are reported to extend 0.5 mile offshore in places.

Chart 18465–Sheringham Point is marked by a light. A fog signal is at a white square building close S of the light. Victoria marine radio station (VAK) is at Sheringham Point.

From Sheringham Point the coast continues in a series of bays and inlets for 16.5 miles to Race Rocks.

Beechey Head, 11.5 miles ESE of Sheringham Point, is bold, wooded, and steep-to. Vessels bound up the strait and passing outside Race Rocks should give Beechey Head a berth of 2 miles.

Race Rocks, 5 miles E of Beechey Head, are a cluster of bare low rocks from 0.5 mile to almost 1.5 miles from shore. Foul ground extends for 0.5 mile in all directions from the light; dangerous overfalls and races occur during bad weather. A light, fog signal, and radiobeacon are on the largest rock of the group, and a lighted buoy marks the SE rock of the group. The tidal currents in Race Passage and in the vicinity of Race Rocks attain a velocity of 4 to 6 knots at times, and dangerous tide rips are formed.

Firing practice and **exercise areas** of the Canadian Armed Forces are E of Race Rocks in the approaches to Esquimalt and Victoria Harbors. (See the Annual Edition of Canadian Notices to Mariners.)

Foul ground, due to dumping of heavy steel wire mesh material, is 3.2 miles W from Race Rocks Light.

E of Race Rocks the Strait of Juan de Fuca expands to a width of about 16 miles, and extends for 30 miles ENE to the entrance to Admiralty Inlet on the S and Rosario Strait on the N.

A 25-fathom bank lies 8.5 miles SE of Race Rocks along the steamer track from Race Rocks Light to Point Wilson Light. The W edge of this bank is sometimes sharply defined by a line of ripples with glassy calm water to the E.

Bentinck Island, 1 mile NW of Race Rocks Light, is fringed with kelp on its S and E sides. **Pedder Bay, Parry Bay,** and **Royal Roads,** separated by William Head and **Albert Head,** form the coast between Bentinck Island and the W entrance to Esquimalt Harbor.

A **027°43′–207°43′ measured nautical mile** has been established on the NW shore of Parry Bay. Range beacons, consisting of fluorescent orange diamond-shaped daymarks, mark the NE and SW ends of the measured course.

A **prohibited area** has been established in Parry Bay by the Canadian Government. No vessel may anchor in the area without permission.

William Head is a comparatively low promontory extending about 0.5 mile NE of **Ned Point.** It is marked by a light and fog signal. Close W of William Head is **Quarantine Cove,** on the E shore of which are the conspicuous red brick buildings of the former quarantine station, now used as a penitentiary. Unauthorized vessels should not approach William Head within 200 yards.

Anchorage affording protection from W weather may be had in 7 fathoms about 0.5 mile N of William Head and about 1,200 yards from the mainland.

Constance Bank, 6.8 miles E of William Head Light, has general depths of 8 to 13 fathoms. It is about 2 miles long and 1 mile wide, within the 20-fathom curve. The bottom is rocky, and tide rips form in this vicinity. Vessels should not attempt to anchor on the bank.

Albert Head, 3.3 miles NE of William Head, is marked by a light and fog signal. **Fisgard Island,** on the W side of the entrance to Esquimalt Harbor, is marked by a light. Its red sector covers **Scroggs Rocks** off the E entrance point. Scroggs Rocks are marked by a light.

Esquimalt Harbor, about 3 miles NNE of Albert Head, affords safe and ample anchorage and can be entered at any time. The entrance channel has general depths of 8 fathoms. Depths within the entrance gradually decrease for 1.5 miles N to **Cole Island,** above which the head of the harbor dries.

Victoria Harbor, landlocked and well protected, is about 2 miles ESE of Esquimalt Harbor, and can accommodate large vessels. A U.S. Immigration station is in Victoria.

Victoria Harbor is entered between **Macaulay Point** on the W and the breakwater extending from **Ogden Point** on the E; the breakwater is marked by a light with a fog signal. Vessels requiring a pilot are requested to notify **"Pilots Victoria"** by radio station **VAK** at least 6 hours in advance of their estimated time of arrival. The harbor extends for more than 0.5 mile N to **Shoal Point** on the E side, and thence trends E to **James Bay.** From the N part of James Bay, the upper harbor, which is crossed by three bridges, extends about 0.8 mile NNW to **Selkirk Water,** the W extremity of which is connected to **Portage Inlet.**

Brotchie Ledge, the only outlying danger, about 200 yards long within the 5-fathom curve, lies 0.6 mile S of Ogden Point. The ledge has a least depth of 12 feet, and is marked by a light and fog signal.

Clover Point, 2 miles ESE of the entrance to Victoria Harbor, is low, bare of trees, and steep-to. Strong tide rips form off the point.

Trial Islands, 4 miles E of Victoria Harbor, are bare and rocky; from most directions the two islands appear as one. The islands are marked by a light and fog signal. The S and larger island is 80 feet high, and from **Staines Point,** its S extremity, a rocky ledge that uncovers 2 feet extends about 100 yards. Severe tide rips form off Staines Point, especially on the flood tidal current, which attains a velocity of 3 to 6 knots during large tides. The point should be given a wide berth.

Discovery Island, 2 miles ENE of **Gonzales Point,** lies off the junction of Haro Strait and the Strait of Juan de Fuca. The island is wooded, and near its SE tip, **Pandora Hill** attains a height of about 125 feet. The island is marked by a light and fog signal. The shores on all sides of the island are fringed with rocks in some places extending as far as 600 yards offshore.

Charts 18465, 18421, 18429.–Strait of Juan de Fuca, E end.–Hein Bank, with a least depth of 2¾ fathoms, lies 8.5 miles SE of Discovery Island; it is about 2 miles long in a N direction, within the 10-fathom curve, and 0.8 mile wide. The shoalest part of the bank is covered with thick kelp in the summer. It is marked by a lighted bell buoy equipped with a radar transponder beacon (Racon). (See Racons, chapter 1, for additional information.)

Smith Island, 5 miles W of Whidbey Island and 8 miles ESE of Hein Bank, is irregular in shape and about 0.5 mile long. The E end is low, but rises abruptly to an elevation of 55 feet at its W end, terminating in a white perpendicular cliff composed of sand and gravel. Kelp extends about 1.5 miles W of the island, with a width of about 1.5 miles over depths of 4 to 6 fathoms; a rock covered 3½ fathoms lies about 1.8 miles W of the light. A rock that bares at lowest tides is about 0.3 mile W of the light. Strong currents set in and around the shoal area, especially on the flood, and deep-draft vessels should keep well outside the 10-fathom curve to avoid being set into danger. **Smith Island Light** (48°19.1'N., 122°50.6'W.), 97 feet above the water, is shown from a 45-foot skeleton tower with a red triangular daymark near the W extremity of the island; a radiobeacon is at the station.

A **restricted area** of a air-to-surface weapon range is W of Smith Island. (See 204.220, chapter 2, for limits and regulations.)

Minor Island, small, low, and rocky, lies 1 mile NE of Smith Island, and at lowest tide is connected with it by a gravel and boulder spit. A light and fog signal are on the island.

The N part of **Whidbey Island** forms the E side of the Strait of Juan de Fuca. This part of the island has a uniform sandy shore backed by low and rolling upland of farm and wooded areas.

The aerolight (48°20.9'N., 122°40.2'W.) at Ault Field is conspicuous.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1385, chapter 2.

Charts 18485, 18484.–On the S side of the Strait of Juan de Fuca the coast trends E for 4 miles from Cape Flattery to **Koitlah Point,** the W point of Neah Bay. The shores are rugged, and the country is heavily timbered.

Neah Bay, about 5 miles E of Cape Flattery, is used extensively by small vessels as a harbor of refuge in foul weather. Its proximity to Cape Flattery and ease of access at any time make the anchorage very useful. It is protected from all but E weather.

Baadah Point, the E entrance point to Neah Bay, is rocky and grass-covered for some distance back from the shore. **Waadah Island,** 0.3 mile N of Baadah Point, is 0.5 mile long, high, and wooded. A rubblestone breakwater extends from the W side of the bay to about the middle of Waadah Island. A reef and foul ground extend 0.2 mile from the SW side of the island. A wharf, used by the Coast Guard, is on the S end of the island. A light and fog signal are at each end of the island. A reef that bares, marked by a lighted bell buoy, extends 500 yards NW from **Dtokoah Point,** SE of the entrance.

The buildings of the Coast Guard station, 0.4 mile SW of Baadah Point, are prominent from the entrance.

Storm warning signals are displayed. (See chart.)

The buoyed entrance to the bay is between Waadah Island and Baadah Point. Depths of 14 to 16 feet can be carried into the bay. The careful navigator can carry 16 feet through the entrance by use of the chart and by favoring the S side of the entrance, passing the lights close aboard that mark the ends of the Makah Indian T-head pier about 375 yards W of Baadah Point. After passing the lights let the chart be the guide to the best water. Anchorage is in 20 to 40 feet, sandy bottom.

The W shore of Neah Bay is high and precipitous, and bordered by craggy rock outcroppings. The shore E of the village of Neah Bay is a low sand beach to Baadah Point. The unmarked wreck of a 32-foot fishing vessel in 37 feet of water and covered 28 feet, is near the middle of the bay in 48°22'25"N., 124°36'50"W.; mariners are advised to exercise caution when anchoring in the vicinity of the wreck.

The Indian village of **Neah Bay,** on the SW shore of the bay, is the site of considerable sport fishing and logging. Logs are trucked to a boom on the breakwater, 900 yards from the W end, where rafts are made up.

Neah Bay is a **customs port of entry**. The customs officer also performs **immigration** duties.

The Makah Indian T-head pier with a 300-foot face and privately marked at each end by a light, and the ruins of a T-head pier no longer visible, are about 375 and 500 yards SW of Baadah Point. Caution is advised in the vicinity of the pier in ruins, as submerged piles may exist. The Coast Guard pier is 0.5 mile W of Baadah Point.

Two cooperative fish piers, 1 mile and 1.2 miles

SW of Baadah Point, have facilities for icing and supplying fishing boats. Limited berthage, electricity, gasoline, diesel fuel, water, and ice are available. Both piers have reported depths of 12 feet off the ends. There are many small-craft floats extending along the S shore of the bay. Neah Bay has no public haulout or repair facilities.

A paved highway extends along the Strait of Juan de Fuca to Port Angeles; telephone service is available.

Chart 18460.–From Neah Bay to Clallam Bay, the coast for more than 14 miles is rugged and the back country high and heavily wooded.

Seal Rock and **Sail Rock,** about 2 miles E of Neah Bay and about 600 yards offshore, are very prominent. Seal Rock, the W one, is 100 feet high with a flat top showing E, and light in color. Sail Rock, 0.2 mile E of Seal Rock, is lower and more pointed. Covered rocks extend from Seal Rock to shore, and there are patches of kelp in this area.

The wreck of the steamer ANDALUCIA, once partially visible but now completely covered, is just off Seal and Sail Rocks.

Two marinas, about 0.1 mile apart, are along the shore near Sail Rock. Berths, gasoline, water, ice, and 2-ton hoists are available. Mariners are advised to exercise caution in approaching the marinas because of the numerous rocks and ledges. The floats at the marinas bare at low water. **Sail River** empties near Seal and Sail Rocks. **Sekiu River,** about 6.5 miles SE of Sail River, has some logging operations. The bridge over the river shows prominently through the trees.

Clallam Bay, about 15 miles SE of Neah Bay, is a broad open bight about 2 miles long and 1 mile wide. It affords anchorage in 6 to 10 fathoms, sandy bottom, and is used to some extent in S or thick weather.

Slip Point, the E point of the bight, is high and wooded; there is a light-colored streak like a landslip down its face, which is visible for a long distance. A reef, extending 0.2 mile W of the point, is marked by a bell buoy. **Slip Point Light** (48°15.9'N., 124°14.9'W.), 55 feet above the water, is shown from a 50-foot white square tower on a pile structure on the W extremity of the point; a fog signal is at the light.

Sekiu is a resort and sport fishing town on the W end of Clallam Bay and S of Sekiu Point. A resort at the N end of the town has berths within a stone breakwater with gasoline, water, ice, a launching ramp, and limited marine supplies available. The floats bare at low water. A small-craft basin, protected by a curved stone breakwater, is at the center of the S shore of the bay. Gasoline, berths, water, ice, and a launching ramp are available. **Clallam Bay,** a small town on the E side of Clallam Bay, has no waterfront facilities.

In entering Clallam Bay, give Slip Point a berth of more than 0.2 mile to avoid the reef projecting W of it. Storm-bound vessels generally anchor abreast the rocky point near the middle of the long semicircular beach on the S shore of the bay.

Pillar Point, 6.7 miles ESE of Slip Point, is bold, 700 feet high, wooded up to its summit, with a dark pillar-shaped rock more than 100 feet high lying close under its E face. The rock shows prominently from W. Good anchorage may be had in 9 to 12 fathoms, sticky bottom, about 0.8 mile SE of Pillar Point. This anchorage offers good shelter from the heavy W swell, but gives no protection from the brisk E and NE winds that prevail in winter.

Twin Rivers are two small streams that flow into the strait about 7 miles E of Pillar Point. An earthfilled barge-loading facility, 0.3 mile W of West Twin River, has a reported depth of 15 feet alongside. The facility is owned by a cement company and used for barging clay to Seattle. A private unlighted range marks the approach to the facility.

Chart 18465.–Shoal water makes out a considerable distance from **Low Point** (48°09.6'N., 123°49.5'W.), 5 miles E of Twin Rivers, and vessels should not approach this point closer than 0.8 mile. Many boulders that uncover are W of the point.

Agate Bay, 3.5 miles E of Low Point, is clear and deep; 10 fathoms can be carried to within 0.2 mile of the shore.

Crescent Bay, 4.2 miles E of Low Point, is a small semicircular bight 1 mile in diameter. The E part is shoal and near the W shore the remains of a wharf should be avoided. This is not a good landing place in N weather. The anchorage is of limited extent and suitable only for small vessels. A resort at the W end of the bay has floats with berths for about 80 craft. Electricity, gasoline, diesel fuel, water, ice, and a 2-ton hoist are available. **Crescent Rock,** covered ¼ fathom and marked by a lighted bell buoy, is 0.4 mile N of the W entrance point of Crescent Bay. The rock extends 0.4 mile in E direction, with a narrow channel between it and the point. The channel has a reported depth of 10 fathoms and is not recommended without local knowledge. A reef extends about 400 yards NW from **Tongue Point,** the E entrance point of Crescent Bay. A shoal, covered 1¼ fathoms, is about 0.3 mile W of Tongue Point. A wreck is off the entrance about 0.3 miles N of Tongue Point.

Observatory Point is 3 miles E of Tongue Point. Between these points is a wooded ridge which, because of the lower land behind it, makes this area appear as an island when raised from E or W. The ridge attains an elevation of 1,135 feet, and is known as **Striped Peak.** A rock, 20 feet high, is close off Observatory Point; the rock and the point are almost joined at low water.

Freshwater Bay, about 4 miles E of Crescent Bay, is a broad open bight, affording anchorage in 6 to 10 fathoms. The bay and adjacent waters are designated as an **emergency explosives anchorage.** (See 110.1 and 110.230 (a)(1) and (b), chapter 2, for limits and regulations.)

Angeles Point, on the E side of Freshwater Bay, is low, sandy, and covered with alders. The **Elwha River** empties into the strait at this point.

A microwave tower, marked by aircraft warning lights and a good landmark by day and night, is on Angeles Point.

Caution.–The U.S. Navy advises that the Strait of Juan de Fuca Calibration Lighted Bell Buoy (48° 14.3'N., 123°24.1'W.), about 6 miles N of Ediz Hook, is used by naval vessels to make equipment calibration tests. Surface vessels or submerged submarines may be maneuvering in circles in the vicinity of the buoy for several hours or days. When these operations are in progress, a single group of fixed amber lights displayed at the E end of Ediz Hook will indicate a surface vessel is maneuvering around the buoy, and two groups of fixed amber lights will indicate submerged submarine operations are being conducted about 1 mile S of the buoy. Light groups in these configurations will be visible from both N and S of Ediz Hook. Mariners transiting this area are requested to proceed with caution.

A **Vessel Traffic Service** has been established in the Strait of Juan de Fuca, E of Port Angeles, and in the adjacent waters. (See 161.101 through 161.189, chapter 2, for regulations, and the beginning of this chapter for additional information.)

Chart 18468.–Port Angeles, 6.5 miles E of Freshwater Bay and 56 miles from Cape Flattery, is entered between **Ediz Hook,** a low, narrow, and bare sandspit 3 miles long, and the main shore to the S. The harbor, about 2.5 miles long, is easy of access by the largest vessels, which frequently use it when awaiting orders or a tug, or are weatherbound.

The harbor is protected from all except E winds, which occasionally blow during the winter. During SE winter gales, the wind is not usually felt but some swells roll in. The depths are greatest on the N shore and decrease from 30 to 15 fathoms in the middle of the harbor; from the middle, the depths decrease regularly to the S shore, where the 3-fathom curve in some places in the E part is nearly 0.2 mile from the beach. A rock covered 19 feet is reported in the approach to the harbor in about 48°07'25"N., 123°23'00"W. A depth of 25 feet is off the Rayonier, Inc. Pier, the easternmost pier on the waterfront, and a shoal with a least depth of 3 fathoms lies 350 yards NW of the NW corner of the pier. A buoy is 225 yards off the NW corner of the pier.

Extra caution in navigating the waters inside Ediz Hook should be exercised because of the large number of submerged deadheads or sinkers in the area. Deadheads or sinkers are logs that have become adrift from rafts or booms, have become waterlogged, and float in a vertical position with one end just awash, rising and falling with the tide.

The best **anchorage** is off the wharves, in 7 to 12 fathoms, sticky bottom.

A **nonanchorage area** has been established in the E part of Port Angeles Harbor. (See 110.229, chapter 2, for limits and regulations.)

Extensive log booming grounds in the N part of the harbor extend more than 1 mile from the W shore. Care must be taken when anchoring at night to avoid the rafted logs; the booming grounds are charted.

Ediz Hook Light (48°08.4'N., 123°24.5'W.), 85 feet above the water, is shown from the top of the Coast Guard air station control tower, 0.3 mile W of the E extremity of Ediz Hook. A radiobeacon and a fog signal are near the E end of the point. Coast Guard radio station **NOW** is at the air station. A shoal, with a least depth of 44 feet and marked by a lighted bell buoy, is about 3.4 miles WNW of Ediz Hook Light.

Port Angeles is on the S shore of the harbor. Logs, lumber, plywood, newsprint, pulp, shakes and shingles, and petroleum products are the principal commodities handled.

Storm warning signals are displayed. (See chart.)

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots may be obtained at Port Angeles. (See Pilotage, beginning of this chapter for details.) The pilot station is about 0.7 mile W from Ediz Hook Light. A pier for berthage of the pilot boats is on the S side of Ediz Hook, adjacent to the pilot station.

Towage.–Tugs to 1,200 hp are stationed at Port Angeles, and tugs to 5,000 hp are available from Seattle with advance notice.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Port Angeles is a **customs port of entry.**

Coast Guard.–A Coast Guard station is on Ediz Hook, about 0.3 mile W of the E extremity. The Coast Guard maintains a **vessel documentation office** in Port Angeles. (See appendix for address.)

Harbor regulations.–The Port of Port Angeles Manager's office is at the port docks.

Wharves.–The major piers described, both private and port operated, extend along the S and W sides of the harbor. For a complete description of the port facilities refer to Port Series No. 37, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths of the facilities described are reported depths. (For information on the latest depths contact the port authorities or the private operators.)

Port-operated facilities:

Port Terminal No. 1 (48°07'30"N., 123°26'24"W.): 2,365-foot berthing space with dolphins; 45 feet along N side, 26 to 45 feet along S side, 35 to 40 feet at the end: deck height, 17 feet; 17,000 square feet covered storage; 96,000 square feet open storage; 5-ton tracked gantry crane running along the N side of the pier; pipeline connections to storage tanks of several oil companies; tracks on pier connect to a national railroad; shipment of general cargo, lumber, logs, pulp, and other forest products.

"T" Pier, Port Terminal No. 3 (between Port Terminal No. 1 and Chevron Oil Co. Pier to the W): 368-foot berthing space with dolphins; 45 feet alongside; deck height, 17 feet; receipt and shipment of general cargo, shipment of logs, lumber, newsprint.

Privately operated facilities:

Rayonier Wharf (48°07'12"N., 123°24'23"W.): 1,855 feet of berthing space with dolphins; 5 to 28 feet along E side, 10 to 28 feet along W side; deck height, 16 feet; more than 19,000 square feet covered storage; receipt of petroleum products by tanker on W side, receipt of chemicals and shipment of pulp by barge on E side of pier; owned and operated by ITT Rayonier, Inc.

British Columbia Steamship Co. Ferry Terminal (48°07'15"N., 123°25'38"W.): Terminus of the Port Angeles to Victoria daily ferry carrying passengers and automobiles during the summer, miscellaneous mooring during the rest of the year; operated by the British Columbia Steamship Co.

Angeles Gravel and Supply Co. Wharf (48°07'19"N., 123°25'41"W.): receipt of sand and gravel by barge; fish company on the pier receives fish and ices fishing boats; owned by Angeles Gravel and Supply Co., operated by Angeles Gravel and Supply Co., and Peter Pan Seafoods, Inc.

Pier No. 2, Black Ball Ferry Slip and Wharf (48°07'21"N., 123°25'45"W.): Terminus of passenger and automobile ferry connecting Port Angeles and Victoria, B.C.; ferry makes two trips daily in spring and fall, four trips daily in summer, and no trips from December 1 to April 30; operated by Black Ball Transport, Inc.

Peninsula Plywood Corp. Woodchip Dock (48°07'27"N., 123°26'23"W.): 280-foot berthing space with dolphins; 10 to 12 feet alongside; deck height, 25 feet; offshore barge berth used for shipment of woodchips and sawdust by barge; owned and operated by the Peninsula Plywood Corp.

Chevron Oil Co. Wharf (48°07'31"N., 123°26'36"W.): 220-foot berthing space with dolphins; 20 to 25 feet alongside; deck height, 16 feet; receipt of petroleum products, fueling small vessels; owned by Chevron Oil Co.; operated by Chevron Oil Co., Texaco, Inc., Atlantic Richfield Co., and D & D Distributors.

M & R Timber Log Dock (48°07'57"N., 123°27'33"W.): 800-foot berthing space with dolphins; 27 to 36 feet alongside; deck height, 17½ feet; shipment of lumber; owned and operated by M & R Timber Co., Inc. **Note:** Vessels moor portside-to at this wharf; a tug is recommended for both docking and undocking.

Crown Zellerbach Plant Wharf (48°08'08"N., 123°27'37"W.): 514-foot berthing space with floats; 10 to 40 feet alongside; deck height, 17½ feet; approximately 28,000 square feet covered storage; receipt of fuel oil for plant consumption, receipt of pulp, wood chips by barge, shipment of newsprint; owned and operated by Crown Zellerbach Corp. **Note:** A 25-foot shoal is charted about 100 feet E of the face of the wharf; a tug is recommended in undocking.

In addition to the facilities mentioned, there are several small piers and wharves at which tugs and other floating equipment moor. Many log dumps are in the harbor.

Supplies.–Water, ice, and marine supplies are available. Diesel oil and gasoline are available at the port boat haven and at an oil-receiving pier near the port piers. Port Angeles has no facilities for bunkering large vessels.

Repairs.–Port Angeles has no facilities for making major repairs to large oceangoing vessels; the nearest such facilities are in Seattle, Wash.

Small-craft facilities.–**Port Angeles Boat Haven,** operated by the port, is a large, well-equipped small-craft basin in the SW part of the harbor that can accomodate a large fleet of fishing boats and some pleasure craft. The basin is marked by lights. In July 1981, a controlling depth of 14 feet was in the entrance, and depths of 14 to 15 feet in the NW part of the basin with 9½ to 14 feet in the SE part except for shoaling along the edges. About 450 berths, electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. A boatyard at the E end of the basin has a marine railway that can handle craft to 83 tons or 70 feet long, and a 40-ton mobile hoist that can handle craft to 65 feet long or 22 feet wide. An 83-foot port-operated tidal grid is also available at the yard. Hull and engine repairs can be made at the yard, and electronic repair work can be arranged. The **harbormaster** controls the moorings in the basin and the use of the tidal grid.

A **121°16'–301°16' measured nautical mile** and a 200-yard **measured course** are in the SW part of the harbor close N of Port Angeles Boat Haven.

Communications.–Port Angeles is served by a U.S. highway and a railroad. It is connected by ferry to Victoria, B.C. The airport is 2.5 miles W of the city.

Chart 18465.–From Port Angeles the coast trends E for 13 miles to the end of **Dungeness Spit,** which borders the W side of **Dungeness Bay.** This bay affords is only fair. It is a dangerous place in winter gales, especially from the SE. The bay is formed by a sandspit extending NE 4 miles and forming, in addition to Dungeness Bay, a small lagoon at the head of the harbor that can be entered by light-draft vessels with local knowledge.

A **075°–255° measured nautical mile** has been established on the strait side of Dungeness Spit; the range markers are in the small lagoon at the head of the harbor.

New Dungeness Light (48°10.9'N., 123°06.6'W.), 67 feet above the water, is shown from a 63-foot white conical tower on a dwelling on the outer end of the spit. A radiobeacon and fog signal are at the light.

From the end of the spit a shoal extends NE for 0.8 mile from the light. This has been reported as extending farther N, and it should be passed with caution. A buoy marks the shoal; vessels should not pass between the buoy and the light. A shoal makes out about 1 mile from the S side of the bay.

The best anchorage is in 5 to 9 fathoms, sticky bottom, about 1 mile SE of the light, clear of the cable area.

Dungeness is a small town on the S shore of the bay. The ruins of a former wharf extend about 1,000 yards out across the flats.

COLREGS Demarcation Lines.–The lines established for this part of the coast are described in 80.1385, chapter 2.

Chart 18467.–**Sequim Bay,** 6 miles SE of Dungeness Bay, is a landlocked bay 3.8 miles long. From the NE corner of the bay a sandspit extends W almost to the W shore and terminates in **Kiapot Point,** leaving only a narrow, winding channel marked by buoys, through which 9 feet can be taken with local knowledge. N of this point a shoal, marked on the end by a buoy, extends about 800 yards E from the W shore, and S of Kiapot Point a bar extends across the fairway. Inside is a good anchorage anywhere in 6 to 21 fathoms, muddy bottom. The harbor is seldom used and should be approached only by those with local knowledge. A public launching ramp and several small-craft floats are in the small cove just N of **Pitship Point** on the W side of the bay. A marine research center of the Battelle Memorial Institute, with conspicuous white buildings, is on the W side of the entrance to the harbor abreast the sandspit. Some log rafts are made up in the bay. **Sequim Bay State Park** is at the SW end of the bay.

Protection Island, a prominent feature in approaching Discovery Bay, is 200 feet high near its W extremity, 1.5 miles long and sparsely wooded; its N shore consists of bare, light bluffs. The E end and S shore are clear of dangers, but off **Kanem Point,** its SW end, a shoal extends SW for over 0.2 mile, and depths of 5 fathoms and less are found 0.5 mile W of the point. This shoal is marked by a buoy. **Dallas Bank** extends N from Protection Island; the 10-fathom curve lies about 2.5 miles from the N point. N of the 10-fathom curve the bank drops off abruptly to depths of over 20 fathoms. **Miller Peninsula,** about 6 miles long and 3 to 5 miles wide, separates Sequim Bay and Discovery Bay.

Discovery Bay is 2 miles SSE of Protection Island. George Vancouver, the English explorer, anchored and refitted his ships here for his exploration of these regions in 1792. The bay trends in a SE direction for about 8 miles. The entrance is masked from seaward by Protection Island, which protects it from NW winds. There are no outlying dangers, and the depths are great.

A dangerous sunken wreck is on the W side of the bay about 300 yards S of Mill Point in 48°00′53″N., 122°51′27″W.

In August 1980, a sunken wreck was reported on the E side of the bay in about 48°03′17″N., 122°51′08″W.

Diamond Point is the W point at the entrance to Discovery Bay. A wharf in ruins is just inside the point.

The shore from **Cape George,** the E entrance point of Discovery Bay, for 3 miles to **McCurdy Point,** consists of high, bare, clay bluffs, sparsely wooded on top, attaining a height of 400 feet near the NE end. A shoal covered 2 fathoms extends 0.6 mile NW of McCurdy Point; it is marked by a buoy. Vessels are cautioned not to pass between the buoy and the point.

Chart 18441.–From McCurdy Point the shore trends E for 3.5 miles to **Point Wilson,** the W point at the entrance to Admiralty Inlet, and consists of high, bare, clay bluffs, sparsely wooded on top, decreasing in height near McCurdy Point, and ending abruptly close W to Point Wilson.

Point Wilson Light (48°08.7′N., 122°45.2′W.), 51 feet above the water, is shown from a white octagonal tower on a building on the E extremity of the low point. A radiobeacon and fog signal are at the light.

Shoals extend 0.5 mile NW of Point Wilson to the 5-fathom curve over irregular bottom; these are generally indicated by kelp. The E edge of the shoals rises rather abruptly from deep water. Heavy tide rips extend N of these shoals, being especially heavy with a W wind and ebb current. A lighted buoy marking the shoals is about 0.7 mile NW of Point Wilson Light.

In approaching Point Wilson in thick or foggy weather, especially if the fog signal is not heard, soundings should be taken continuously.

Point Partridge, the W point of Whidbey Island, has a yellow face and is prominent from the N or S; it is rounding and not easily identified from the W. A light and fog signal are on the point. A rocky ledge, marked by a lighted bell buoy, extends 0.5 mile W from the point. In the summer, the ledge is usually marked by kelp.

The W shore of Whidbey Island, between Admiralty Head and Point Partridge, is mostly a sandy beach rising sharply to bluffs 100 to 250 feet high, backed by pine trees. The shoreline is generally strewn with logs.

A naval **restricted area** is off the W shore of Whidbey Island. (See 207.750(c), chapter 2, for limits and regulations.)

Admiralty Head, 80 feet high, on Whidbey Island, is the E entrance point of Admiralty Inlet and the SE extremity of a succession of light bare bluffs which extend N of Point Partridge, where they attain their highest elevation. About 0.5 mile N of Admiralty Head an abandoned lighthouse tower 39 feet high stands on top of a bluff.

From Point Partridge the NW coast of Whidbey Island extends NNE for 11.5 miles to Deception Pass. It is free of offlying dangers, but should not be approached closer than 1 mile.

Partridge Bank, within the 10-fathom curve, is about 3 miles long and 1.5 miles wide; the SE end reaches within 2 miles of Point Partridge. The N and E sides fall off abruptly to 20 and 30 fathoms. The shoalest part, 2¾ fathoms, is near the N side about midway between the ends; it is marked by a buoy. A lighted bell buoy is about 0.6 mile SSE of the 2¾-fathom spot. A considerable part of the bank is covered with kelp, which is usually drawn under by currents. The kelp generally extends to the 7-fathom curve, except toward the E end where the shoal narrows, and no kelp exists beyond a depth of 4 fathoms.

Charts 18421, 18425, 18432, 18433.-The waters of the **San Juan Islands** embrace the passages and bays N of the E end of the Strait of Juan de Fuca. These passages are used extensively by pleasure craft, especially in July, August, and September. Some tugs and barges use the larger passes. Automobile ferries, operated by the State of Washington, are on regular round-trip runs from Anacortes through Thatcher Pass, Harney Channel, Wasp Passage, San Juan Channel, Spieden Channel, and across Haro Strait to Sidney, B.C. The island ferry landings are at Upright Head, Lopez Island; on the E side of the entrance to Blind Bay, Shaw Island; Orcas, Orcas Island; and Friday Harbor, San Juan Island. Oceangoing vessels normally use Haro and Rosario Straits and do not run the channels and passes in the San Juan Islands. Many resorts and communities have supplies and moorage available for the numerous pleasure craft cruising in these waters. Well-sheltered anchorages are numerous.

(Regulations governing vessels transiting gill net fishing areas are given at the beginning of this chapter.)

The directions which follow are intended for use only in clear weather; in thick weather or at night strangers should take a pilot for large vessels. Small craft should not attempt navigation under these conditions without local knowledge. Sailing craft should not attempt the passages against the current unless the wind is fair and fresh. A reliable auxiliary engine for sailboats is an absolute necessity. The tidal currents have great velocity in places, causing heavy tide rips that are dangerous. Because of the variable direction and velocity of the currents, compass courses are of little value, and, where followed, allowance must be made for the set of the current.

Haro Strait and **Boundary Pass** form the westernmost of the three main channels leading from the Strait of Juan de Fuca to the SE end of the Strait of Georgia; it is the one most generally used. Vessels bound from the W to ports in Alaska or British Columbia should use Haro Strait and Boundary Pass, as it is the widest channel and is well marked. Vessels bound N from Puget Sound may use Rosario Strait or Haro Strait; the use of San Juan Channel by deep-draft vessels is not recommended.

A **Vessel Traffic Service** has been established in the Strait of Juan de Fuca, E of Port Angeles, and in the adjacent waters. (See 161.101 through 161.189, chapter 2, for regulations, and the beginning of this chapter for additional information.)

From off the S part of San Juan Island, Haro Strait extends N for about 16 miles to Turn Point Light on Stuart Island, thence Boundary Pass leads NE for 11 miles to its junction with the Strait of Georgia between East Point, the E end of Saturna Island, B.C., and Patos Island, the small United States island; both of which are marked by lights. These waterways have widths from 2 to 6 miles, and the depths are generally great.

No difficulty will be experienced in navigating Haro Strait and Boundary Pass in clear weather; strangers should take a pilot in thick weather.

The E shore of the passage will be described in detail, with only a brief general description of the W shore. More complete detail of the W shore is contained in Pub. 154, Sailing Directions (Enroute) for British Columbia, published by the Defense Mapping Agency Hydrographic/Topographic Center, and the Sailing Directions, British Columbia Coast (South Portion) Vol. 1, published by the Canadian Hydrographic Service.

The International Boundary between the United States and Canada passes through Haro Strait and Boundary Pass.

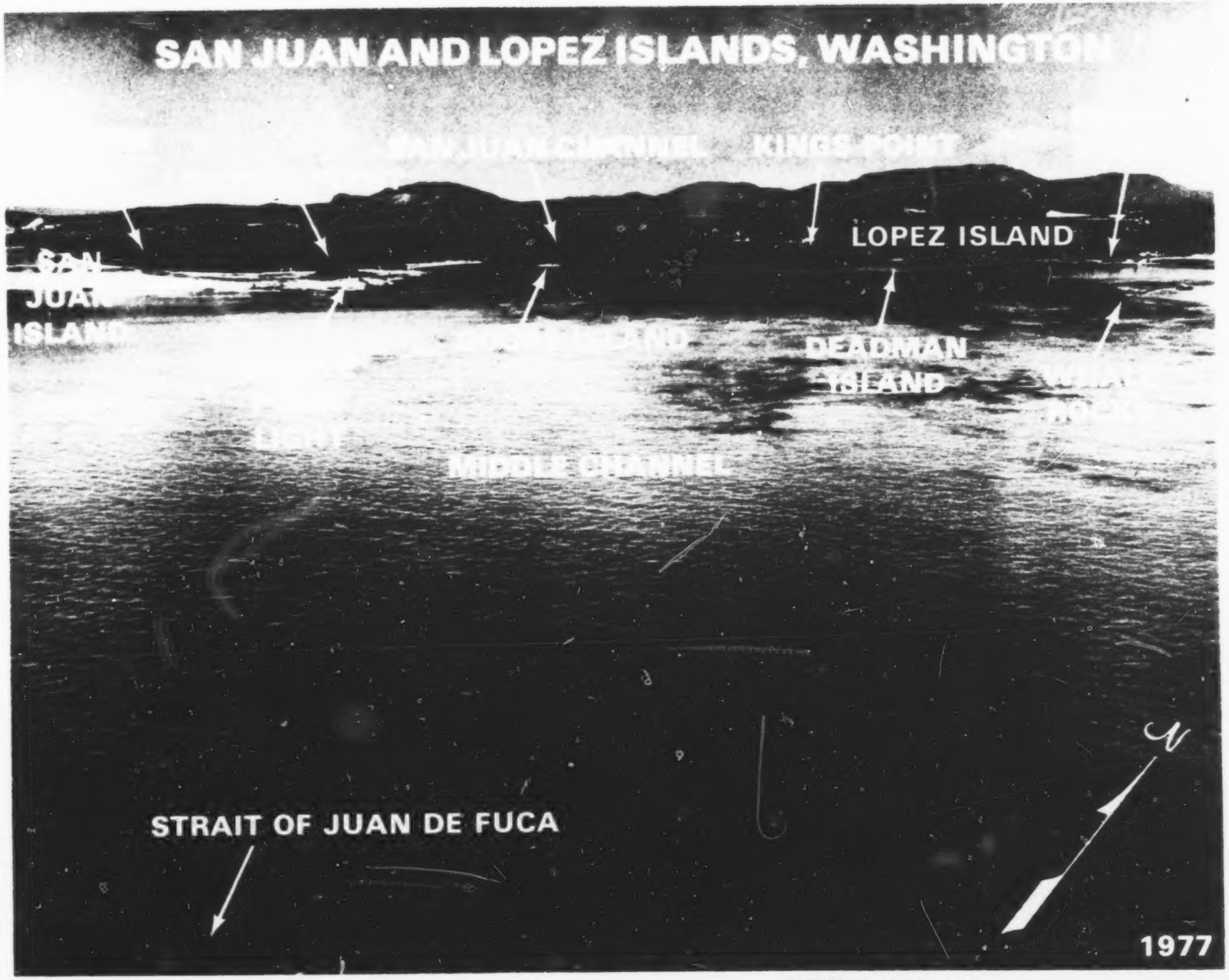
COLREGS Demarcation Lines.-The lines established for the Strait of Juan de Fuca, Haro Strait, Boundary Pass, Rosario Strait, and the Strait of Georgia are described in 80.1385 and 80.1390, chapter 2.

Tidal currents.-In Haro Strait and Boundary Pass the flood current sets N, and the ebb current sets in the opposite direction. The ebb usually runs longer and has a greater velocity than the flood. E of the N entrance, the flood sets E on both sides of Sucia Islands and E across Alden Bank; the velocity is 1 to 5 knots. Off Turn Point, the ebb may attain a velocity of 6 knots during large tides. The current has moderate velocity between Sucia Islands and Orcas Island. There is a large daily inequality in the current. (See Tidal Current Tables for predicted times and velocities.) Heavy tide rips occur on Middle Bank and N of it and around Discovery Island. Tide rips also occur between Henry Island and Turn Point on the ebb and around Turn Point. Heavy dangerous tide rips occur between East Point and Patos Island and for 2 miles N in the Strait of Georgia. The flood current sets E from Discovery Island across the S end of Haro Strait until close to San Juan Island. This E set is especially noticeable during the first half of the flood.

Rocky **Middle Bank,** with a least depth of 11 fathoms, is in the S approach to Haro Strait. The bank is about 3.5 miles long, and the least depth is in its NE part and 5.5 miles SW of Cattle Point Light on the southernmost tip of San Juan Islands. In the vicinity of this bank heavy tide rips, dangerous to small craft, form in bad weather.

Two small banks, covered 7 and 9 fathoms, lie about 3.5 miles NW of Middle Bank. The S bank is marked by a lighted buoy. In bad weather, heavy tide rips form over these banks.

San Juan Island, the largest of the group, is about 13 miles long, rugged, and partly wooded. **Mount Dallas,** the highest of several hills on the island, rises abruptly from the middle of the W side to a height of 1,036 feet. In most places the shores


SAN JUAN AND LOPEZ ISLANDS, WASHINGTON

SAN JUAN CHANNEL
KINGS POINT
LOPEZ ISLAND
SAN JUAN ISLAND
DEADMAN ISLAND
LIGHT
MIDDLE CHANNEL
STRAIT OF JUAN DE FUCA
N
1977

are free of outlying dangers. The N end of the island is indented by several small bays that, with the exception of Roche Harbor, are shoal and of no commercial importance.

From **Eagle Point,** the W shore of San Juan Island trends NW and forms the E side of Haro Strait. This shore is steep-to and rocky, and beyond 400 yards offshore it is free of danger; however, the depths off this shore are too great for anchoring.

Kanaka Bay, a small cove used by fishing boats, is 2.5 miles NW of Eagle Point.

Lime Kiln Light (48°31.0'N., 123°09.1'W.), 55 feet above the water, is shown from a 38-foot white octagonal tower attached to a building on the W side of San Juan Island; a fog signal is at the light. Two dwellings are about 150 yards SE of the light. Rocks awash lie close inshore about 1 mile SE of the light.

Local magnetic disturbance.–Differences from the normal variation of as much as 4° have been observed in the vicinity of **Bellevue Point,** 1 mile N of Lime Kiln Light.

During the June-October fishing season, many purse seiners operate in this area. At night these vessels anchor close inshore, generally between Cattle Point and Pile Point.

Hanbury Point (48°34.7'N., 123°10.3'W.), 3.8 miles N of Lime Kiln Light, is the N entrance point to **Mitchell Bay,** one of a series of well-sheltered bays on the NW coast of the island. **Snug Harbor,** a resort and yacht haven on the S side of Mitchell Bay, has about 90 berths with electricity, gasoline, water, ice, and limited marine supplies. A launching ramp is available; engine repairs can be made to small craft. **Mosquito Pass,** available only to small craft with local knowledge, leads N from Hanbury Point to **Garrison Bay, Westcott Bay,** and Roche Harbor.

A large aquaculture facility, covered 3 feet and consisting of clam beds and suspended oyster racks, is in the middle of Westcott Bay about 1 mile above the entrance. Mariners should use caution in the area.

Henry Island is close W of the N point of San Juan Island, from which it is separated by Mosquito Pass and Roche Harbor.

Kellett Bluff, at the S end of Henry Island, is steep and rocky and prominent from either S or N. It is marked by a light and fog signal. **Open Bay,** E of Kellett Bluff, offers good holding ground and protection for small boats from N and E weather.

Roche Harbor has its main entrance between the N end of Henry Island and the W end of **Pearl Island**, which is marked by a light. Sandspits covered 17 and 18 feet extend into the channel from the islands on each side of the entrance. The landlocked harbor has depths of 4 to 9 fathoms. It affords good anchorage and in the summer is used extensively by yachts.

A large resort is on the E side of Roche Harbor. The resort operates a wharf with shed, floats with berths for about 250 craft, a hotel, cabins, a general store, and a restaurant. Electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available. A **customs office** is on the W side of the wharf. A customs officer is here full time in the summer and on call from Friday Harbor in the winter to inspect visiting Canadian yachts. The customs officer also performs **immigration** and **agricultural quarantine** inspections. A mail plane uses the landing strip at Roche Harbor. A paved road leads to Friday Harbor.

The resort here was the largest lime works W of the Mississippi for many years. A fleet of company-owned sailing ships hauled barreled lime from the works. The company had its own barrel-stave mill on the point E of Pearl Island. The present resort's hotel was built by the lime company in 1886. A ferry operated from here, and a customhouse was in the harbor. The quarry tunnels and the ruins of the old mill are still prominent.

Battleship Island, small and 30 feet high, is about 0.2 mile WNW of McCracken Point, the N extremity of Henry Island, and is the W point in the approaches to Roche Harbor.

Danger Shoal, with a least depth of 1 fathom, is in the fairway to Spieden Channel about midway between Battleship Island and Spieden Bluff. A lighted horn buoy is close SW of the shoal, which is marked by kelp.

A rock, marked by kelp with 1¾ fathoms over it, is about 200 yards NW of **Barren Island,** 0.7 mile E of McCracken Point; it is marked by a buoy. Another rock, marked by kelp and covered 1 fathom, is about 350 yards E.

Spieden Channel leads E between Spieden Island on the N and Battleship, Henry, and San Juan Islands on the S; the channel leads from Haro Strait to President Channel and San Juan Channel. The E entrance, the narrowest part, is 0.6 mile wide, and for 2 miles W of it the channel is free of danger. However, in the W entrance, which has an irregular bottom, are several dangers, but the fairway is deep throughout. The meeting of the flood currents, which flow E from Haro Strait and W from San Juan Channel, cause heavy tide rips and eddies. This channel is not recommended for sailing craft.

Spieden Island lies with **Spieden Bluff,** its NW end, 1.6 miles NNE of Battleship Island. The island is 2.5 miles long in an E direction with an extreme width of 0.5 mile. **Green Point,** the E end of which is marked by a light, is low and grassy. The S side of the island has few trees, but the N face is well wooded.

There are several dangers SE of Spieden Bluff. **Center Reef,** which bares, is 0.7 mile S of the bluff; it is marked off its SW side by a buoy. **Sentinel Rock** and **Sentinel Island** are closer inshore; a rock midway between them is covered ¾ fathom.

Charts 18421, 18425, 18431, 18432, 18433.–Stuart Island, NW of Spieden Island, two prominent hills 640 feet high near the middle. **Turn Point,** the W extremity, is bold, steep-to, and marked by a light and fog signal.

Reid Harbor indents the SE shore of Stuart Island and trends NW about 1.5 miles. The harbor, which is landlocked and 400 yards wide, affords good anchorage in 4 to 5 fathoms, soft bottom. The State Parks and Recreation Commission maintains a small-craft pier and facilities here. The harbor is free of danger, but from the E entrance point foul ground extends about halfway across the entrance. Enter in midchannel and anchor anywhere in the middle of the wider portion of the harbor.

Prevost Harbor, on the N shore of Stuart Island about 1.5 miles E of Turn Point, affords good shelter and anchorage. The village of **Prevost,** with 7 feet at the wharf, is on the W shore. Mail is delivered to the island by air. The State Parks and Recreation Commission maintains a float landing for small boats.

Satellite Island lies within Prevost Harbor, with reefs and shoals extending off its SE extremity. Vessels should not pass E of the island. Enter in midchannel W of Satellite Island and anchor in 6 to 7 fathoms, muddy bottom, in the middle of the wider portion just within the entrance, keeping clear of a rock that uncovers 6 feet, 200 yards off the S shore.

Johns Pass, between Stuart Island and **Johns Island** close E, is much used by fishing vessels and small boats. At the S end of the pass foul ground extends about 0.6 mile SE from Stuart Island.

Waldron Island, 6.5 miles E of Turn Point, is steep and rocky on the E side, but flat with sandy beaches on the N and W sides. It is irregular in shape and 3 miles long. The highest point, 612 feet, is near **Point Disney,** its S end. On the N and E sides of the island is a high yellow sand bluff, terminating abruptly in **Point Hammond.**

Cowlitz Bay, which indents the SW shore of Waldron Island, is a broad, open bight affording anchorage in fair weather. Shoal water extends 0.5 mile S of **Sandy Point,** the W end of the island. **Mouatt Reef,** with a least depth of ½ fathom and marked by kelp, is 0.4 mile offshore and 0.5 mile N of Point Disney. The village of **Waldron,** with a wharf built out to a depth of 7 feet, is on the shore NE of Mouatt Reef. Waldron has a small general store.

Bare Island, small, grassy, and bare of trees, is 0.5 mile NNW of Point Hammond, and **Skipjack Island,** 120 feet high and wooded, is about 1.2 miles NW of Point Hammond. The passage between them should be avoided because of its high current velocity. A small, bare rock is off the E end of Skipjack Island, and a group of rocks awash, are about midway between it and Bare Island. A light is on the NW side of Skipjack Island.

Patos Island, 4.3 miles NNE of Point Hammond, is 60 feet high and wooded except at its W end toward which it gradually decreases in height. **Active Cove,** at the SW extremity of the Island, is reported to be a good anchorage for small vessels with local knowledge. **Patos Island Light** (48°47.3′ N., 122°58.2′ W.), 52 feet above the water, is shown from a 38-foot white square frame tower on **Alden Point,** the W point of the island; a fog signal is at the light.

Sucia Islands, consisting of one large and several smaller islands, are SE of Patos Island and 2.5 miles N of Orcas Island. The large island, 200 feet high and heavily wooded, is horseshoe-shaped; its W side is a series of steep, wooded cliffs. **Echo Bay** indents the E side of the island. In W weather small vessels with local knowledge can find good anchorage in 4 to 5 fathoms near the head of the bay. At the head of **Fossil Bay,** on the S side of **Sucia Island,** there is a State Parks and Recreation Commission small-craft anchorage and float pier; water is available.

Reefs extend about 1.5 miles W of Sucia Islands to **West Bank,** which has a minimum depth of 1¼ fathoms. It is unwise to pass between the bank and the islands.

Clements Reef, 0.5 mile N of Sucia Islands, is about 1.2 miles long and 0.3 mile wide. It is marked at the NW end by a buoy and at the SE end by a daybeacon. The channel between this reef and Sucia Islands should not be attempted without local knowledge.

The tidal currents are particularly strong and dangerous between Patos Island and East Point on Saturna Island, B. C., and for 2 miles N in the Strait of Georgia. The passage between Patos Island and Sucia Islands is almost free of tide rips, and the tidal currents set more fairly through it and are less strong and more regular than in Boundary Pass.

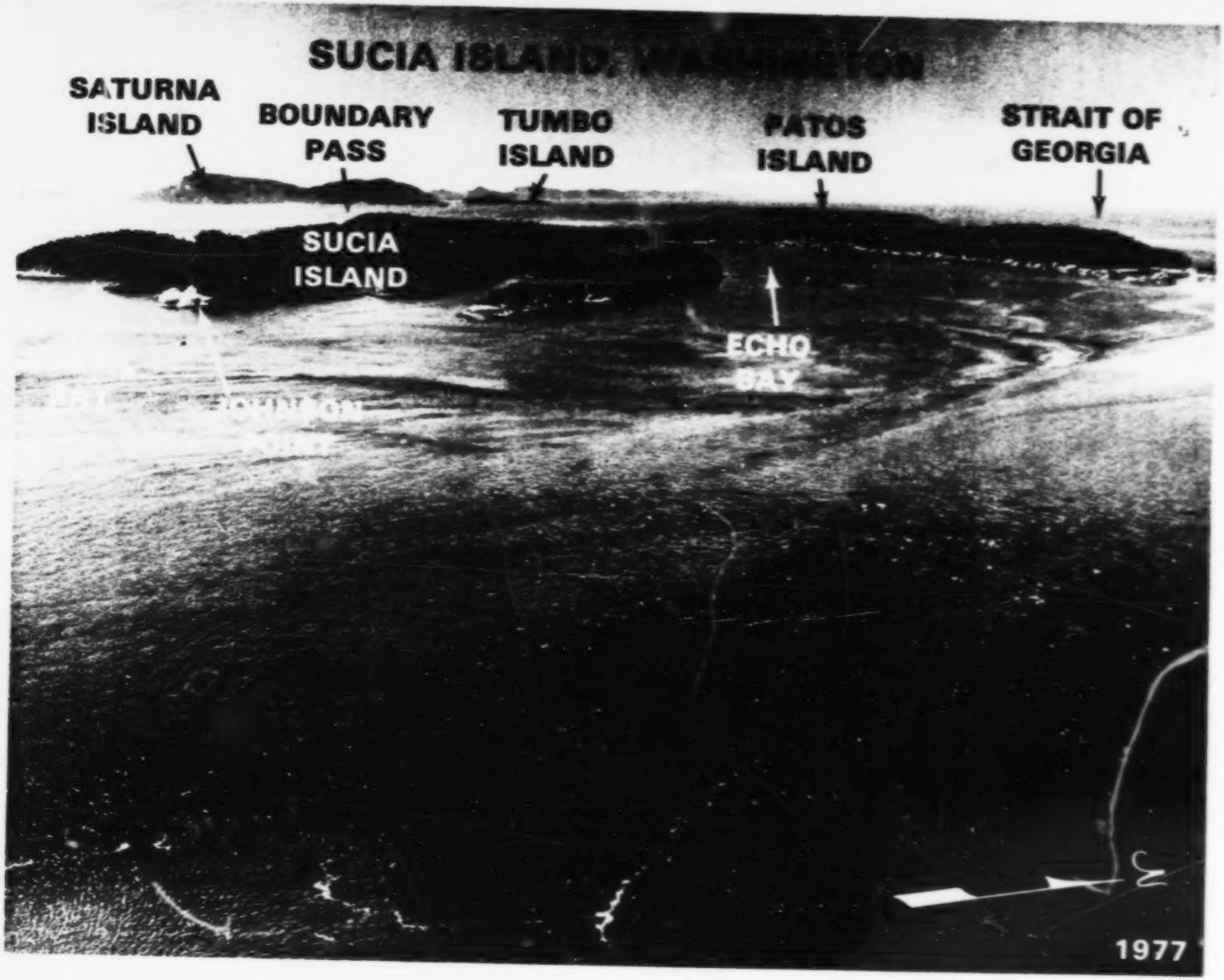
Haro Strait, SW approach (Canada).–The several channels and passages leading between the islands and dangers off the coast of British Columbia from Gonzales Point to **Cadboro Point,** 2.8 miles NNE, constitute the SW approach to Haro Strait. These passages and channels should be used only by vessels with local knowledge.

The side of Haro Strait W of the international line is bordered by several islands and reefs, the most important of which are, from S to N: **Kelp Reefs,** about 7 miles N of Discovery Island on the Canadian side; **Sidney Island,** some 3 miles NW of the light on Kelp Reefs; **Moresby Island,** 16 miles N of Baynes Channel and Discovery Island, and the smaller islands and reefs in between.

Swanson Channel, used sometimes as an alternate route by vessels bound for Alaska points, extends NW between Moresby Island and the **Pender Islands,** and connects ultimately with Active Pass to reach the Strait of Georgia in 48°53′N.

Active Pass is deep but tortuous and in its narrowest part is about 600 yards wide. The dangers do not extend over 200 yards from shore. Vessels should enter the pass at slack water, if possible, but a vessel with a speed of 10 knots can always get through. A vessel with local knowledge can take advantage of the eddies and variations of the tidal currents, but others should keep in midchannel. Great care should be taken to avoid the shoals on either side of the N entrance to the pass.

Enterprise Reef, in the S approach to Active Pass, consists of two rocky heads about 400 yards apart. The W head uncovers 3 feet, and the E head is awash. Foul ground extends between the heads


SUCIA ISLAND, WASHINGTON
SATURNA ISLAND
BOUNDARY PASS
TUMBO ISLAND
PATOS ISLAND
STRAIT OF GEORGIA
SUCIA ISLAND
ECHO BAY
JOHNSON POINT
1977

and 200 yards W of the W head. A light is on the W head, and a buoy marks the E head.

South Pender Island, 3 miles N of Stuart Island, is marked by a light on **Gowlland Point,** its SE extremity. The last of the Canadian lights in this stretch is on **East Point,** the E point of **Saturna Island,** 6.2 miles ENE of Gowlland Point.

Rosenfeld Rock, 1.2 miles NNE of East Point, is marked by a lighted buoy. The rock is covered by 1¼ fathoms, and rocks that bare are within 900 yards of it. Close E of the rock, overfalls and dangerous tide rips are formed.

(See Pub. 154, Sailing Directions (Enroute) for British Columbia, published by the Defense Mapping Agency Hydrographic/Topographic Center, and Sailing Directions, British Columbia Coast, (South Portion) Vol. 1, published by the Canadian Hydrographic Service for more details of the islands and features on the Canadian side.)

San Juan Channel, the middle one of three principal channels leading from the Strait of Juan de Fuca to the Strait of Georgia, separates San Juan Island from the islands E. It is 13 miles long from its S end to its junction with President Channel at the N end. San Juan Channel is deep throughout and, except near its S entrance, has few off-lying dangers.

Currents.–In the S end of San Juan Channel, between Goose Island and Deadman Island, the average current velocity is 2.6 knots on the flood and ebb, however, maximum flood currents of 5 knots or more cause severe rips and eddies. Daily current predictions for this location may be obtained from the Tidal Current Tables.

Cattle Point, marked by a light and a seasonal fog signal, is the SE extremity of San Juan Island and forms the W point at the S entrance to San Juan Channel. Cattle were once loaded here for shipment to and from Victoria.

Salmon Bank, S of Cattle Point and on the W side of **Middle Channel,** is an extensive shoal covered 1½ to 3 fathoms; it is marked by a lighted gong buoy. Kelp grows on the rocks. **Whale Rocks,** two dark rocks about 5 feet high, are on the E side of Middle Channel 0.6 mile W of Long Island. There are 2¼-fathom spots nearby.

Long Island, 1.5 miles NW of Iceberg Point, is the largest of a group of islands on the E side of the entrance to San Juan Channel.

Lopez Island is the southeasternmost one of the San Juan Islands; **Lopez Hill,** 488 feet high, is near the S midsection of the island. **Iceberg Point,** 3.3 miles SE of Cattle Point, is at the W extremity of the S part of Lopez Island. A light and seasonal fog signal are on the point.

Richardson is a village on the N shore of the cove N of Iceberg Point, and close N of **Charles Island.** Five fuel tanks are prominent from seaward. A wharf directly below the fuel tanks has a face 120 feet long and extends over rocks to a depth of 17 feet. Gasoline, diesel fuel, water, and ice, are available. Outboard engine repairs can be made. Fishing boats operate from here when fishing the Strait of Juan de Fuca. Overhead power cables with clearances of 54 feet are between the mainland and Charles Island. A light is on a ledge extending from the shore off Richardson.

Mackaye Harbor, N of Iceberg Point, has several private piers used by seafood company vessels. The harbor affords good shelter in 5 to 6 fathoms, soft mud; small craft with local knowledge can obtain excellent shelter in **Barlow Bay,** on the S side of the harbor. Vessels approaching Mackaye Harbor or Richardson should pass at least 0.3 mile S and E of the off-lying islands and islets. Local vessels, by keeping close to the N shore to avoid rocks near midchannel, use a small passage between Lopez and Charles Islands, but this should not be attempted without local knowledge. **Twin Rocks,** in midchannel of this small passage, are marked by a daybeacon.

Davis Point, the SW end of Lopez Island, is on the E side of the S entrance to San Juan Channel. **Deadman Island** is close off the E side of the entrance, and several rocks are within 600 yards N of the island. **Goose Island,** small and low, is about 0.5 mile N of Cattle Point and close off the W side of the entrance to San Juan Channel.

Shark Reef, awash, is over a mile N of Deadman Island and close off some white cliffs on the E side of San Juan Channel.

From Goose Island N to **Pear Point,** the W side of San Juan Channel is foul with many rocks covered and awash within 0.7 mile of the shore. However, good anchorage for small vessels can be had W of **Harbor Rock,** at the S end, between the 10 and 20-fathom curves.

North Bay is entered between Pear Point and **Dinner Island.** Gravel is barged from pits on the NW shore of the bay to Vancouver Island. **Little Island,** at the head of North Bay, is connected to the mainland by a narrow spit. A small cannery is on Little Island, and the shores of the island have been bulkheaded. The bay affords fair anchorage in 7 to 10 fathoms, about 800 yards N of Dinner Island. Two dangers are in the approaches to the bay; a rocky shoal covered ¾ fathom 0.7 mile E of Dinner Island, and another rock shoal covered ¾ fathom 0.4 mile SE of Dinner Island. The passage W of Dinner Island should not be attempted.

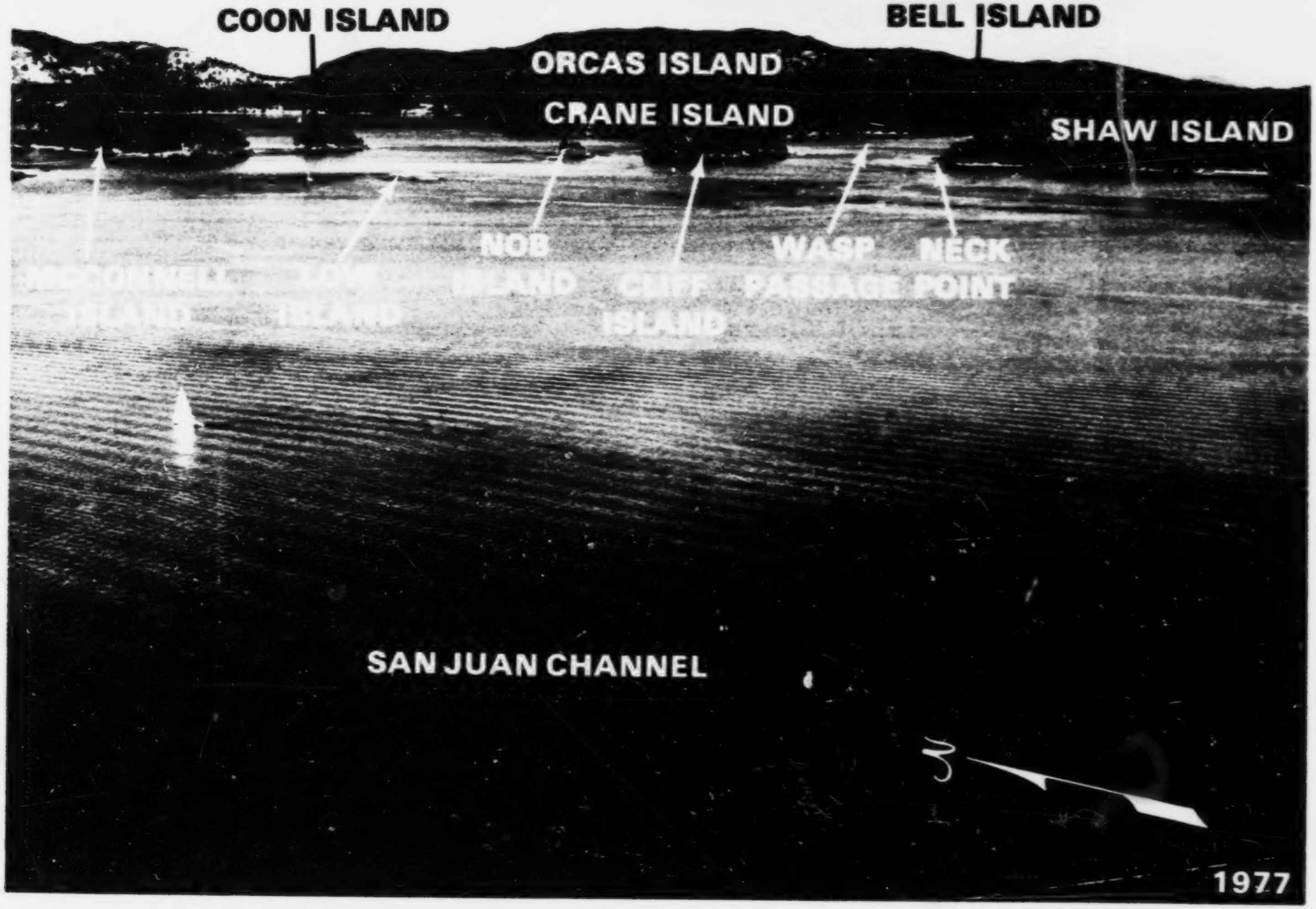
Fisherman Bay, on the E side of San Juan Channel abreast North Bay, is a shallow lagoon entered by a marked, narrow, and tortuous channel. Good anchorage with shelter from all winds may be had in 10 to 12 feet, soft bottom, for small craft with local knowledge. The tidal currents have considerable velocity. **Lopez** is a small village at the entrance. A resort in the bay has a pier and floats with berths for about 45 craft. Electricity, gasoline, water, ice, restaurant, and overnight facilities are available. Outboard engine repairs can be made.

Chart 18425.–At **Turn Island,** off the E side of San Juan Island, San Juan Channel turns NW for about 7.5 miles and connects at its N end with Spieden Channel and President Channel.

Turn Rock, about 0.2 mile E of Turn Island, is a ledge bare at half tide; it should be given a berth of

BEST DOCUMENT AVAILABLE

SAN JUAN CHANNEL, WASHINGTON


COON ISLAND
BELL ISLAND
ORCAS ISLAND
CRANE ISLAND
SHAW ISLAND
McCONNELL ISLAND
LOW ISLAND
NOB ISLAND
CLIFF ISLAND
WASP PASSAGE
NECK POINT
SAN JUAN CHANNEL
1977

at least 100 yards. A light is on the rock. **Reid Rock,** 1.4 miles NW of Turn Rock, is in midchannel off the entrance to Friday Harbor. The rock, covered 2¼ fathoms, rises abruptly from deep water. It is marked by a lighted bell buoy.

Friday Harbor, 1.4 miles W of Turn Island, is a small cove about 1 mile long and nearly as wide. **Brown Island,** locally known as Friday Island because of the housing development here, occupies the middle of the harbor, with shoals nearly 200 yards wide off both its E and S shores. A shoal, covered 3¼ fathoms and marked by a buoy, extends nearly into midchannel from the W shore of the island. Shoals off the SE end of the island are marked by a daybeacon. The harbor may be entered either E or W of Brown Island. Anchorage may be had off the wharves in 6 to 7 fathoms, and city floats provide berthing space for pleasure craft.

Friday Harbor, the town on the W shore of the cove, is the county seat and the population center of San Juan Island, which has some farming and cattle and sheep raising. It is headquarters for the gill net fishing fleet operating through the W part of the islands.

The University of Washington maintains a marine biological laboratory 0.4 mile NNW of the N end of Brown Island. The E pier, a high structure cantilevered about 35 feet out from shore, makes a prominent landmark in entering Friday Harbor. Near the main building is the landing wharf with a 32-foot face and depths of 11 to 13 feet alongside. The wharf is exposed to winds from the NE, but is easily approached. It is marked by private lights.

Friday Harbor is a **customs port of entry.** The customs office is adjacent to the **harbormaster's** office at the port's small-craft harbor. The customs officer also performs **immigration** and **agricultural quarantine** inspections.

The interisland medical clinic at Friday Harbor is the only complete medical facility in the San Juan Islands. In addition, Orcas and Lopez Islands have small clinics that are visited by one of the doctors from Friday Harbor when needed. Air ambulance service to Seattle, Anacortes, or Bellingham is available on all the larger islands.

Friday Harbor has three wharves. Two are oil wharves with 11 feet reported at their face; they receive petroleum products for the island. Diesel fuel and gasoline are available for small craft at these wharves. The SE oil pier has floats with electricity for about 50 small craft in reported depths of 4 to 9 feet on the S side of the pier. Water and ice are available. Hull repairs can be made. The ferry slip is just SE of these wharves. SE of the ferry slip are condominiums with private docks. The Port of Friday Harbor small-craft harbor, protected on the S and E sides by a long floating breakwater marked on the end by a private light, is just NW of the oil wharves. Berths with electricity for about 100 craft and water are available. **Note:** Vessels should not anchor within 100 yards of the floating breakwater because of the danger of fouling with the breakwater's anchor cables. Gasoline is available at a float NW of the port's small-craft harbor. A seaplane float is near the customs float at the port's small-craft harbor. Water, ice, and some marine supplies are available at Friday Harbor.

Two shipyards are at the S end of Friday Harbor. The SE shipyard has a marine railway that can handle boats up to 65 feet long. A 25-ton lift is at the SE yard, and a 50-ton lift is at the NW yard. Complete hull and engine repairs can be made.

Freight and passengers reach Friday Harbor by airplane or by State ferry. The town has an airport with surfaced runways; twin-engine aircraft can be accommodated. Mail is transported by air.

Point George, the W point at the entrance to **Parks Bay,** is across the channel from Friday Harbor. Good anchorage for small craft in 6 to 8 fathoms, soft bottom, can be had in this bay. The head of the bay, however, is foul.

Wasp Islands are in the W approach to West Sound between **Neck Point,** the NW tip of Shaw Island, and **Steep Point,** the SW extremity of Orcas Island. Several narrow channels lead between the islands; the channels in general use are the North and Pole Passes, close under the Orcas Island shore. The tidal currents have considerable velocity in the channels, which should be attempted only by vessels with local knowledge.

North Pass, between Steep Point on Orcas Island and the Wasp Islands, leads E from San Juan Channel to Deer Harbor and into Pole Pass. The pass is about 0.2 mile wide between Steep Point and **Reef Island,** and is free of outlying dangers, except for a rock covered by 1¾ fathoms 0.3 mile E of the N end of Reef Island.

Deer Harbor, E of Steep Point, has good anchorage in 6 to 7 fathoms about 0.2 mile from the head. **Fawn Island** is near the entrance of the harbor and about 200 yards from the W shore; vessels may pass on either side. The E shore of Deer Harbor should be given a berth of at least 300 yards because of a shoal which in some places extends more than 200 yards off.

Deer Harbor, on the E side of the harbor, is a village with stores, a marina, and an inn. Pleasure boats call here frequently in the summer. Private berthing for about 100 craft, water, and some marine supplies are available.

A private light is on the end of a pier about 0.8 mile SSE of the town of Deer Harbor.

Crane Island is off the entrance to Deer Harbor and about 1 mile SE of Steep Point. The N shore of the island is foul with bare and covered rocks within 250 yards of it. A shoal covered ½ fathom is 350 yards N of the center of the N side of the island, and a rock that uncovers 5 feet is 200 yards off the E point, with foul ground between it and the shore.

Pole Pass leads from North Pass to West Sound and separates Crane Island from Orcas Island; the fairway is 75 yards wide in its narrowest part. Pole Pass should not be attempted without local knowledge. A light is on the NE side of the pass at its narrowest part.

Wasp Passage leads from San Juan Channel to West Sound and separates Crane Island from the N shore of Shaw Island. The passage should not be attempted without local knowledge. A light is on the rock 300 yards E of Bell Island at the E end of the pass, and on Cliff Island and **Shirt Tail Reef,** at the W end of the pass.

Bell Island, small and wooded, is about 0.3 mile E of Crane Island. Vessels using Pole Pass pass Bell Island close-to in order to avoid reefs and shoals extending from the Orcas Island shore.

Cliff Island, the southernmost of the Wasp Islands, is 0.4 mile SW of Crane Island, and is marked by a light on its S side. **Low Island,** small and 10 feet high, is about 700 yards W of Cliff Island, and **Nob Island,** 40 feet high, is close-to and NW of Cliff Island. Local vessels bound from Friday Harbor to Deer Harbor use a clear deep channel about 70 yards wide through the rocks and shoals lying between Cliff Island and Low Island.

Yellow Island, the westernmost of the Wasp Islands, is about 0.8 mile WNW of Neck Point and about 3.5 miles NNW of Friday Harbor. The island is small, grassy, and nearly bare of trees. A shoal extends 300 yards W of the island and terminates in a rock that uncovers 3 feet and is marked by kelp. This island should be given a berth of not less than 0.5 mile. **McConnell Island,** NE of Yellow Island, is the largest of the group. **Coon Island,** is close to and SE of McConnell Island. **Bird Rock,** which uncovers, is between McConnell and Crane Islands, and is marked by a light.

Jones Island, 2 miles N of Wasp Passage, is on the E side of the N entrance to San Juan Channel; the island is wooded. Small pleasure craft anchor in the bight in the N shore. A State marine park here has mooring facilities; water is available.

Spring Passage separates Jones Island from the SW part of Orcas Island. A daybeacon with the words "Danger-Rocks" is on the NW side of the passage near Jones Island. In general, the passage is free of danger.

Rocky Bay is an open bight in the E side of San Juan Island. **O'Neal Island,** surrounded by a shoal, is almost in the middle of the bay.

Limestone Point, about 1.2 miles NNW of O'Neal Island forms the W point of the N entrance to San Juan Channel, and is the NE portion of San Juan Island. Heavy tide rips and eddies form off Limestone Point and Green Point on Spieden Island, 0.7 mile N.

Lonesome Cove, 0.2 mile W of Limestone Point, has a resort with cabins. Limited berthage and gasoline are available.

Flattop Island, prominent in the N approaches to San Juan Channel, is 1 mile NE of the E end of Spieden Island. It is about 174 feet high, flat on top, and sparsely covered with underbrush and trees. **Gull Rock,** 33 feet high and bare, is about 0.3 mile NW of the NW shore of the island.

Charts 18421, 18431, 18432.–White Rock, 35 feet high, is about 2.7 miles N of the junction of Spieden and San Juan Channels and about midway between Flattop and Waldron Islands. Rocks, bare and covered, marked by kelp, extend nearly 0.3 miles NW from White Rock. **Danger Rock,** covered 3 feet and marked by kelp, is 0.3 mile SE of White Rock.

The NW approach to San Juan Channel from Boundary Pass extends between Waldron Island on the E and Stuart Island and its dangers on the W.

President Channel, between Waldron and Orcas Islands, is about 5 miles long. Depths are generally great, and the passage is free of dangers. The tidal currents have a velocity of 2 to 5 knots, and heavy swirls and tide rips, especially with an adverse wind, are off the N point of Waldron Island and between Waldron and Patos Islands. The rips are generally heaviest with the ebb current. Rips and swirls are also heavy off Limestone Point and the E end of Spieden Island.

Orcas Island is wooded and mountainous. **Mount Constitution,** in its E part, is marked by a stone lookout tower. **Turtleback Mountain (Turtle Back Range)** and **Orcas Knob,** conical, and bare on the summit, in the W part of the island, are prominent and easily recognized.

Point Doughty, the NW tip of Orcas Island, is bare and terminates in a small knob on its outer end. A resort in the bight, 1.5 miles SSW of Point Doughty, has floats with about 40 berths, gasoline, water, ice, a concrete launching ramp, and some marine supplies. In 1973, a depth of 4 feet was reported at the floats.

Local magnetic disturbances.–Differences from the normal variation of 2° or more have been observed in the vicinity of Point Doughty.

Parker Reef, marked by a light, is about 0.7 mile off the N shore of Orcas Island and uncovers. The rocky reef extends about 110 yards in all directions from the light, except on the E side, where it extends about 160 yards from the light. Kelp covers the reef and the area between it and the shore. There are several shoal spots of 1¾ to 2¾ fathoms in the area within the 10-fathom curve SSW and W of Parker Reef.

A resort at **Terrill Beach** on Orcas Island, S of Parker Reef, has a 200-foot pier with floats for about 15 craft; depths of 5 feet are reported off the end of the pier. Gasoline, water, ice, a concrete launching ramp, and some marine supplies are available. Limited engine repairs can be made.

A passage between Sucia Islands on the N and Orcas Island on the S connects the N end of President Channel with the junction of the Strait of Georgia and Rosario Strait.

Chart 18425.–Minor passages, San Juan Islands.– Upright Channel, between Lopez Island and Shaw Island, is about 3 miles long. **Canoe Island,** off **Flat Point,** constricts the passage to a width of less than 400 yards. Flat Point is marked by a light. General depths in the channel range from 20 to 25 fathoms. A shoal, covered 7½ fathoms, is 700 yards SSW, and a rock awash is 250 yards SW of the SW end of Canoe Island. Anchorages for small craft may be had in **Indian Cove,** W of Canoe Island, in 4 to 7 fathoms, soft bottom.

Harney Channel, between Shaw and Orcas Islands, is the approach to West Sound from the E. General depths in the channel range from 11 to 30 fathoms with a 9-fathom shoal 700 yards E of Broken Point, the northernmost extremity of Shaw Island.

Orcas, the settlement on the N shore in a cove at the W end of Harney Channel, is a summer resort. A hotel and several stores are here. An oil company distributor has a wharf with about 10 feet at its face; gasoline and diesel fuel are available. Five white tanks are near the back of the wharf. Water, ice, and some marine supplies are available. The ferry slip just E of the wharf serves the interisland ferry that operates from Anacortes. A rock, covered 2½ fathoms, is about 125 yards S of the wharf; deep water is between the rock and the shore.

Blind Bay, a small cove indenting Shaw Island just opposite Orcas, is shoal and in it there are several reefs. **Blind Island** is in the entrance. **Shaw Island,** a village at the E entrance, is served by the ferry. It has a store, warehouse, and a float landing with berths for about 25 craft. Gasoline, diesel fuel, water, and ice are available. **Broken Point,** 1.6 miles W of the Shaw Island landing, projects some 0.3 mile N from the N side of the island. It is quite prominent.

West Sound indents the W part of the S shore of Orcas Island for about 2.8 miles. **Massacre Bay** is in the N part. The depths range from 7 to 20 fathoms. Anchorage in 7 to 12 fathoms may be had anywhere N of **Double Island,** which consists of two small islands connected at low water; it is close to the W shore near the entrance.

West Sound, a settlement on the E shore about 2 miles inside the entrance, has a wharf with 10 feet off its end. Only a few piling remain of an old sawmill wharf. Care should be taken when leaving the wharf to avoid some submerged piling about 100 feet SW of it. Gasoline, water, and marine supplies are available at West Sound.

Picnic Island, is a low islet in the S part of the cove, close S from West Sound settlement. A shoal extends about 150 yards W from the island. In the bight E of the island is a marina with berths for about 80 small craft. An 11-ton hoist here can handle craft to 36 feet for hull and engine repairs. Marine supplies and a salvage and retrieval tug are available. In 1969, a channel with a depth of 1½ feet was reported to exist between Picnic Island and Orcas Island; local knowledge is advised.

Harbor Rock, 4 feet high, lies in midchannel about 1.9 miles above the entrance to the sound; it is just inside Massacre Bay. The rocky patch marked by a daybeacon, is of small extent and is surrounded by depths of 1¾ to 10 fathoms.

Charts 18421, 18429, 18430.–East Sound indents Orcas Island NNW for about 6 miles. Depths vary from 15 fathoms at the entrance to 9 fathoms less than 0.2 mile from the head. There are no outlying dangers, and the shores may be approached to within 0.2 mile; however, a shoal covered less than 5 fathoms extends some 700 yards off the W shore, 0.8 mile inside the entrance. Anchorage may be had anywhere in the sound.

Local magnetic disturbance.–Differences from the normal variation of about 2° have been reported in the upper end of East Sound.

Olga is a summer resort on the W shore of **Buck Bay,** a small cove on the E shore of the sound just inside the entrance. Gasoline, water, and ice may be obtained. A State-owned pier here has reported depths of 10 feet at its face.

Cascade Bay, a small cove on the E side of the sound, about 3 miles N of the entrance, is the site of a large resort with floats having berths with electricity for about 60 craft. Gasoline, diesel fuel, water, ice, a launching ramp, and a restaurant are available. Depths of 8 feet are reported alongside the floats. The large white resort hotel on **Rosario Point,** the W point of the bay, is conspicuous.

Eastsound, a summer resort in the W of two small adjoining coves at the head of the sound, is the second largest village in the islands. The wharf is built out to a depth of 7½ feet; gasoline and water are available. A medical clinic is at Eastsound; air ambulance service to Anacortes, Bellingham, or Seattle is available.

Obstruction Pass, with a least width of 350 yards, separates **Obstruction Island** from Orcas Island, and leads W from Rosario Strait to the inner passages and sounds of the San Juan Islands. A resort, on the N side of the pass about 0.6 mile NW of Deer Point, has about 35 berths, gasoline, water, ice, 20-foot marine railway, and a 1½-ton hoist; minor hull repairs can be made. Obstruction Pass is marked by lights on the N side of Obstruction Island.

Peavine Pass, safer and straighter than Obstruction Pass, separates Blakely Island from Obstruction Island. The pass is a little over 200 yards wide at its narrowest part, and in midchannel the least depth is 6 fathoms. Peavine Pass Light 1, on the SW point of Obstruction Island, marks the W entrance to the pass. In 1973, two submerged rocks were reported in the pass about 0.4 mile E of Peavine Pass Light 1. A group of bare rocks, marked by a daybeacon, lie about 0.2 mile offshore from Blakely Island at the E entrance to Peavine Pass, and a rock, covered 1¾ fathoms and marked on its S side by a lighted buoy, is 1.3 miles SW of Peavine Pass Light 1.

The currents through Obstruction and Peavine Passes have estimated velocities of 5.5 to 6.5 knots at times. Heavy tide rips occur E of Obstruction Island.

Blakely Island, E of Lopez and Shaw Islands, is privately owned and maintained but open to the public. At its N end, bordering on Peavine Pass, is a small-craft basin and channel. About 65 berths are at the cove dock and inside the basin. An airplane landing strip and lodging are nearby. Gasoline, diesel fuel, water, ice, and some marine supplies are available.

Thatcher Pass, between Blakely Island and

Decatur Island, is about 0.5 mile wide in its narrowest part. The pass is deep and free of danger, except for **Lawson Rock,** marked by a daybeacon, in midchannel 700 yards N of Fauntleroy Point. The S point of Blakely Island is marked by a light.

Fauntleroy Point, the NE end of Decatur Island, is marked by a light. With a S wind and ebb current, heavy rips will be encountered off the E entrance to Thatcher Pass.

Leo Reef, in the entrance to **Swifts Bay** on the NE end of Lopez Island, uncovers and is marked by a light. **Port Stanley** is a small village on the shores of Swifts Bay.

Upright Head, the northernmost point of Lopez Island, is a narrow peninsula that attains an elevation of 260 feet. A ferry slip is in the small cove at the tip of this peninsula. A private light is 50 yards out from the slip. There is daily ferry service with the other islands and the mainland.

Lopez Sound, on the E side of Lopez Island, may be entered from Rosario Strait by Thatcher Pass. The depths in the greater part of the sound are 3 to 5 fathoms, muddy bottom, but a narrow and deeper channel is along the E shore.

Fair protection in SE weather can be had in the area W of Decatur Island and N of **Center Island** in 3 to 5 fathoms, mud bottom. Strong winds blow across the low neck at the S end of Decatur Island and may make the area W uncomfortable for small craft. Good anchorage in W weather can be had in the large bight on the W side of the sound.

Decatur is a small village on the W side of Decatur Island. A wharf with depths of 8 feet at its end is here.

Lopez Pass, S of Decatur Island, leads from Rosario Strait into Lopez Sound. The pass has depths of 9 to 12 fathoms, but is very narrow and little used. A light is at the S end of Decatur Island.

Rosario Strait, the easternmost of the three main channels leading from the Strait of Juan de Fuca to the Strait of Georgia, is 20 miles long and from 1.5 to 5 miles wide. The water is deep, and the most important dangers are marked.

The strait is in constant use by vessels bound to Bellingham, Anacortes, and the San Juan Islands. Vessels bound for British Columbia or Alaska also frequently use it in preference to the passages farther W, when greater advantage can be taken of the tidal currents.

A Vessel Traffic Service has been established in the Strait of Juan de Fuca, E of Port Angeles, and in the adjacent waters. (See 161.101 through 161.189, chapter 2, for regulations, and the beginning of this chapter for additional information.)

(See the beginning of this chapter for regulations governing vessels transiting the gill net fishing areas.)

Currents.–For times and velocities of current in Rosario Strait and vicinity, the Tidal Current Tables should be consulted. The currents in Lopez, Thatcher, and Obstruction Passes are reported to attain velocities of 3 to 7 knots. This should be kept in mind when proceeding through Rosario Strait, particularly at night or in thick weather. On the ebb of a large tide off the entrance to the passes, a S wind causes tide rips that are dangerous to small craft.

Small craft can get good protection from W and S weather by anchoring near the head of **Watmough Bay,** at the extreme SE end of Lopez Island.

Colville Island, 64 feet high, small and bare of trees, is off the SE end of Lopez Island. Heavy kelp extends W of Colville Island. **Davidson Rock,** 0.3 mile E of Colville Island, bares and is marked by a light. Mariners should give Colville Island and Davidson Rock a good berth. The southbound lane of the Traffic Separation Scheme is close S and E of Davidson Rock.

Aleck Bay, the W and largest of three small bays on the S shore of Lopez Island, affords good anchorage except in heavy SE winds for small vessels in 4 to 7 fathoms, mud bottom. Rocks, awash and covered, and reefs abound in these waters, and caution is essential.

A bank covered 10 to 20 fathoms extends across the S entrance to Rosario Strait. A shoal covered 3½ fathoms and marked by a lighted bell buoy is in the W part of the bank, 1.6 miles E of Davidson Rock Light. **Lawson Reef,** small in extent with a least depth of 1¾ fathoms and marked by a lighted bell buoy, is in the E part of the bank, 1.7 miles W of Deception Island.

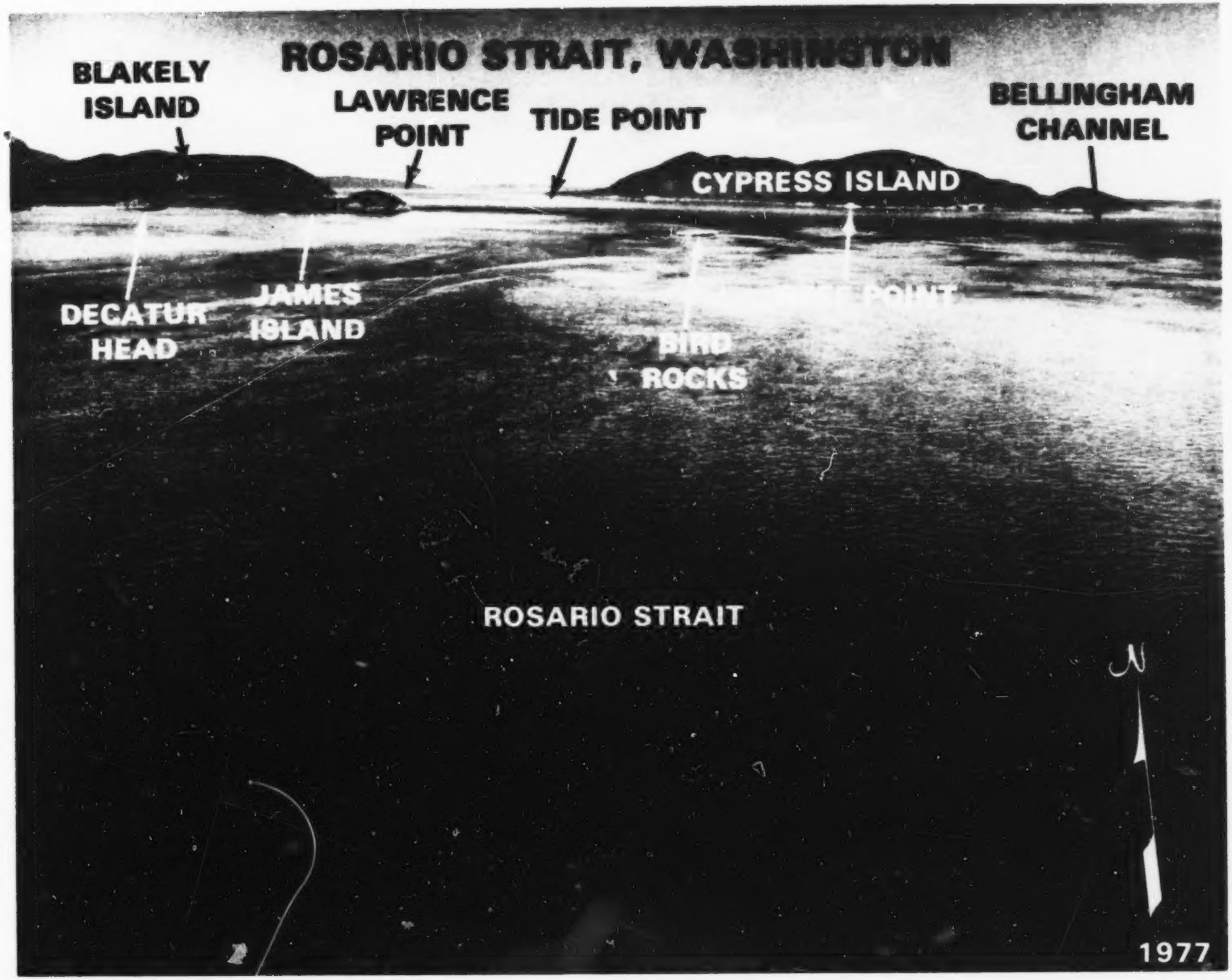
Charts 18427, 18429, 18421.–Deception Pass, the impressive 2-mile passage between Whidbey Island and **Fidalgo Island,** provides a challenging route that connects the N end of Skagit Bay with the S end of Rosario Strait. Near its middle the width is reduced to 200 yards by **Pass Island.** A fixed highway bridge over the pass between Pass Island and Whidbey Island has a clearance of 144 feet at the center and 104 feet elsewhere. Overhead telephone and power cables 100 yards and 0.2 mile E of the bridge have a minumum clearance of 150 feet.

Deception Pass is used frequently by local boats bound from Seattle to Anacortes, Bellingham, and the San Juan Islands. The pass should be negotiated at the time of slack, since the velocity of the stream at other times makes it prohibitive to some craft. However, many fast boats run it at all stages of the tide. The pass is also used by log tows from the N bound to Everett or Seattle, which prefer this route to avoid the rough weather W of Whidbey Island.

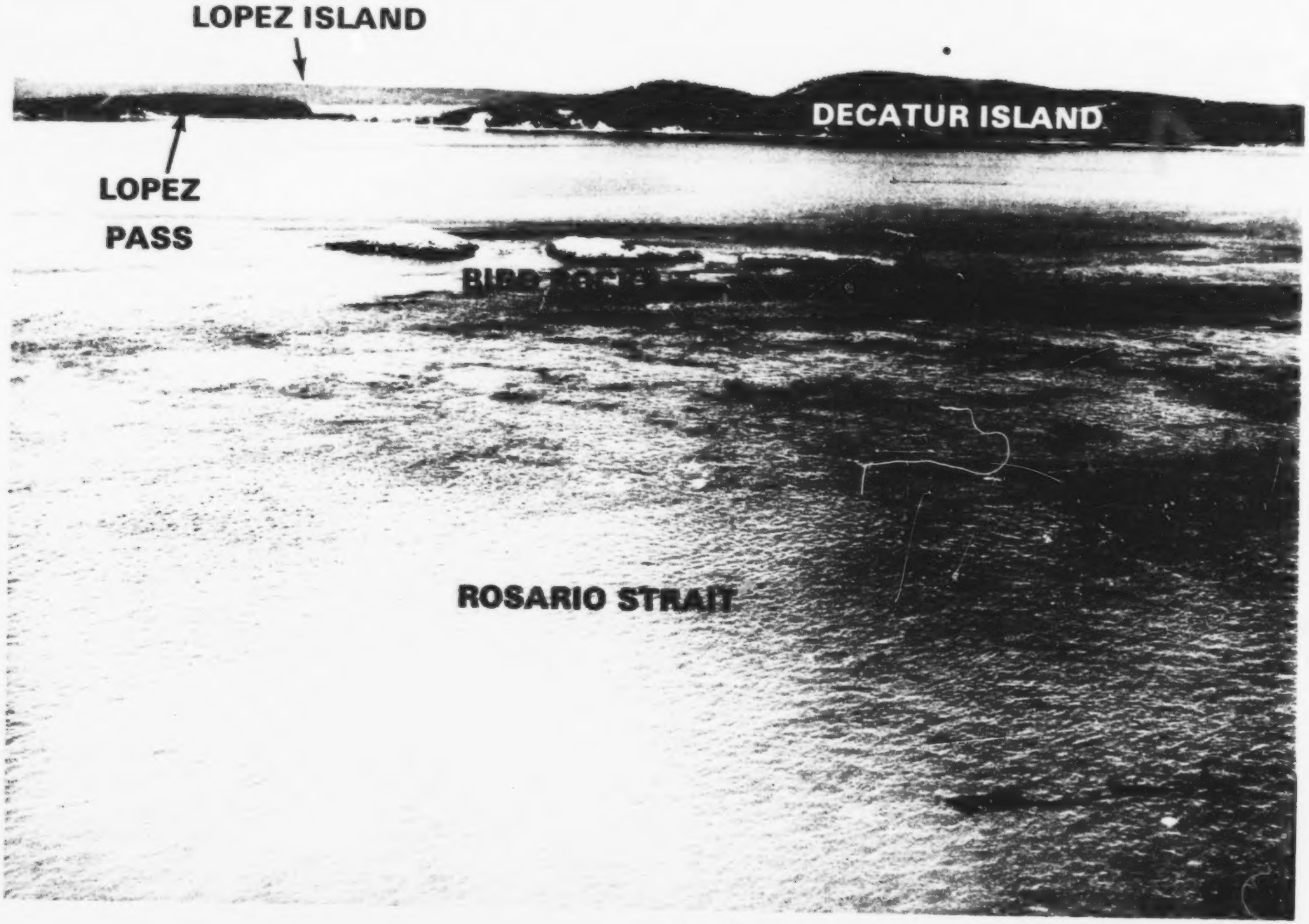
Currents in the narrows of Deception Pass attain velocities in excess of 8 knots at times and cause strong eddies along the shores. With W weather, heavy swells and tide rips form and make passage dangerous to all small craft. (See the Tidal Current Tables for daily predictions.)

Canoe Pass, N of Pass Island, is not recommended except for small craft with local knowledge.

Deception Island, 1 mile W of Pass Island, is 0.4 mile NW of **West Point,** the NW end of Whidbey Island. Foul ground exists between West Point and Deception Island. Vessels should not attempt to


ROSARIO STRAIT, WASHINGTON
BLAKELY ISLAND
LAWRENCE POINT
TIDE POINT
BELLINGHAM CHANNEL
CYPRESS ISLAND
DECATUR HEAD
JAMES ISLAND
BIRD ROCKS
POINT
ROSARIO STRAIT
N
1977

ROSARIO STRAIT, WASHINGTON


LOPEZ ISLAND
DECATUR ISLAND
LOPEZ PASS
BIRD ROCKS
ROSARIO STRAIT

pass between them, and should always stay in **Northwest Pass.** Shoals also extend N of Deception Island with depths of less than 2 fathoms nearly 200 yards offshore. (See chart.)

Strawberry Island lies almost in the middle of Deception Pass, 0.4 mile E of Pass Island. **Ben Ure Island** is 0.2 mile S of Strawberry Island at the entrance to Cornet Bay; a light is at the NE end of the island.

Cornet Bay, shallow and suitable for small craft only, indents the N end of Whidbey Island, in Deception Pass. A marina with a privately dredged entrance channel and mooring basin is in the bay; the channel is marked by private daybeacons. The marina has about 85 open and covered berths at the floats, and electricity, gasoline, water, diesel fuel, ice, launching ramp, 4-ton hoist, and marine supplies; hull repairs can be made. Overhead power cables with clearances of 56 feet cross the W end of the bay.

Routes.–From W the best water through Deception Pass will be found 0.3 mile W of **Rosario Head,** a point 0.5 mile N of Deception Island. Steer a SE course to pass about 100 yards SW of the light on Lighthouse Point; then follow an E course through the middle of the pass, being careful to guard against sets from the current when running partly across it. After passing under the bridge, favor slightly the N shore so as to avoid the pinnacle rocks and ledges making out from the S shore. After leaving Pass Island, steer to pass about midway between Ben Ure and Strawberry Islands. Strawberry Island should not be approached within 125 yards because a reef, marked by kelp, extends S of the island. From a position off Ben Ure Island Light 2, steer a NE course to pass about midway between **Hoypus Point** and **Yokeko Point.** The flood current N and W of Strawberry Island sets NE and should be guarded against.

Bowman (Reservation) Bay, a small bight between **Reservation Head** and Rosario Head, offers anchorage for small craft in 2¼ fathoms, mud bottom. **Northwest Island** between Rosario Head and Sares Head, is 28 feet high and grass-covered. **Sares Head,** 1 mile N of Deception Island, is steep-to and 480 feet high.

Burrows Bay indents the W shore of Fidalgo Island between **Biz Point** and **Fidalgo Head.** Burrows Bay is a broad open bight affording anchorage in the N part, in 15 to 16 fathoms, soft bottom. Protection from W and N is afforded by **Burrows Island** and **Allan Island,** but the bay is exposed to S weather. In the SE part, the depths are less than 6 fathoms, and in places shoals extend almost 0.4 mile off the E and S shores of the bay. E of the passage between Allan and Burrows Islands is a middle ground with a least depth of 5 fathoms. Small craft using Deception Pass, bound to or from points in the islands or from Bellingham Bay, pass through Burrows Bay and the passage N of Burrows Island.

Burrows Island Light (48°28.6′N., 122°42.7′W.), 57 feet above the water, is shown from a 34-foot white square tower on a building at the W end of the island; a fog signal is at the station.

Local magnetic disturbance.–Differences from normal variation of 4° have been observed on the E shore of Burrows Bay.

Williamson Rocks, a group of small, grass-covered islets and rocks, are 0.5 mile S of Allan Island and are marked on the S side by a lighted gong buoy. **Dennis Shoal,** 500 yards off the S shore of Allan Island and 0.6 mile NW of Williamson Rocks, bares and is marked on its W side by a buoy.

Flounder Bay, a well-sheltered basin and popular yachting harbor at the N end of Burrows Bay, is the site of a large marina with an airstrip. The entrance channel is protected by jetties, and marked by private lights and daybeacons. In 1980, 13 feet was reported in the entrance, thence in 1973, 5 feet was reported in the basin. Gasoline, diesel fuel, water, ice, about 250 berths with electricity, transient berths, dry storage facilities, launching ramp, two 1½-ton hoists, 24-ton lift, and marine supplies are available at the marina. Hull, engine, and electronic repairs can be made. A highway connects the bay with the State ferry terminal in Ship Harbor and with Anacortes.

Charts 18421, 18424, 18429, 18430, 18431.–Bird Rocks, consisting of three rocks close together, are near the middle of Rosario Strait, about 2 miles WNW of Burrows Island Light. The southernmost and largest is 37 feet high. There is deep water close-to, and passage may be made on either side of the rocks.

Belle Rock, bare at extreme low water and marked by a light, is about 0.5 mile NE of Bird Rocks. Belle Rock can be passed about 0.6 mile to the E by keeping **Tide Point,** the W extremity of Cypress Island, and **Lawrence Point,** the E end of Orcas Island, in range on a bearing of about 359°.

Rosario Strait is generally clear, with great depths, except for the following principal offshore dangers:

Kellett Ledge, 2 miles N of Point Colville, extends 700 yards off **Cape St. Mary,** on the SE part of Lopez Island. The ledge is marked by kelp and a buoy, and uncovers at the lowest tides.

James Island is close off **Decatur Head,** the E end of Decatur Island, and between the two is a deep but narrow passage; on the island are two hills with heights of 260 and 219 feet.

Pointer Island, 16 feet high, is 0.3 mile off the SE shore of Blakely Island, and **Black Rock,** 4 feet high and marked by a daybeacon, is 0.5 mile off the E shore of the island.

Cypress Island, 1,530 feet high, steep on the lower slopes and gently rounding at the top, is on the E side of Rosario Strait and opposite Blakely Island. From S the island appears to lie in the middle of Rosario Strait.

A shoal extends about 0.4 mile S from **Reef Point,** the SW tip of Cypress Island. A lighted buoy is about 0.7 mile S of Reef Point. Vessels rounding the point should not attempt to pass between the buoy and the point as submerged piles and heavy kelp may exist in that area.

Strawberry Island, small, low, and wooded, is about 400 yards off the W shore of Cypress Island. Passage E of it is not recommended. An indifferent anchorage may be had in **Strawberry Bay** in 7 fathoms; it is seldom used.

Lydia Shoal, a patch covered 3¾ fathoms and marked on its S side by a lighted gong buoy, is 1 mile E of Obstruction Pass Light. **Peapod Rocks,** marked by a light on the largest rock of the group at the N end, are 1 mile S of Lawrence Point on Orcas Island. This group of islands extends about 1 mile in a NE direction, some 0.5 mile from the Orcas Island shore, which is fringed with rocks and reefs.

Buckeye Shoal, with a least depth of 3½ fathoms, is 1.2 miles SSE from **North Peapod,** and is marked by a lighted bell buoy. Between this and the N end of Cypress Island are **Cypress Reef,** a dangerous rocky patch marked by a daybeacon, and **Towhead Island,** 0.3 mile to the SE and about 400 yards N of the N end of Cypress Island. The passage between the two is used by local vessels, especially those plying between Obstruction Pass and Bellingham Bay.

Doe Bay indents the SE shore of Orcas Island abreast Peapod Rocks. **Doe Bay (Doebay),** a village on the bay, has a wharf with 12 feet at its end; during strong S winds the wharf should not be approached. Doe Island, 0.6 mile SSW of Doe Bay, is a State park.

Sinclair Island, N of Cypress Island, is wooded and comparatively low in places; dangerous reefs extend 0.8 mile off the N shore. Portions of **Boulder Reef,** the outermost danger, uncover at half tide; kelp marking the reef is frequently drawn under by the current. The outer end of the reef is marked by a lighted bell buoy. **Urban,** a village at the SW end of the island, has a pier with depths of 12 feet at the end.

Lummi Island, wooded and about 8 miles long, forms the E side of the N end of Rosario Strait, opposite Orcas Island. The N part is low, but in the S part **Lummi Peak** attains an elevation of over 1,600 feet.

Lummi Rocks are off the SW shore of Lummi Island about 3 miles NW of **Carter Point,** the S tip. They are marked by a light.

Shoals extend over 0.5 mile from **Point Migley,** the NW extremity of Lummi Island; the NW edge of the shoals is marked by a lighted buoy. **Village Point** on the NW side of Lummi Island is marked by a light. A marina in **Legoe Bay,** the open bight S of Village Point, has gasoline, diesel fuel, water, ice, and a 2-ton hoist; repairs to outboard engines can be made.

Clark Island and **Barnes Island,** and the several adjacent rocks and islets, lie almost in the middle of Rosario Strait, about 2.5 miles NNW of Lawrence Point on Orcas Island. These islands may be passed on either side, giving them a berth of 0.5 mile.

Matia Island, a wildlife refuge about 4 miles W of Point Migley, is 120 feet high and wooded. The mooring float of a State marine park is in the small cove on the NW side of the island; water is available. **Puffin Island,** 40 feet high, is about 0.2 mile E of Matia Island. A reef, marked at its SE extremity by a light, extends E from the SE end of Matia Island to a point about 0.2 E of Puffin Island. Mariners should not attempt to pass between the islands.

Alden Bank, 3 miles N of Matia Island, within the 10-fathom curve is about 3 miles long in a SE direction. The shoalest part, on which are patches of 2¾ and 3 fathoms, covering a considerable area, is near the SE part of the bank. The bank is marked by lighted gong buoys off its NW and SE extremities and by a buoy on its E edge.

Chart 18427.–Skagit Bay, N part, between the N part of Whidbey Island and the mainland, is entered from the N through Deception Pass and from the S through Saratoga Passage. Skagit River, described in chapter 13, empties into the SE part of the bay.

The greater portion of Skagit Bay is filled with flats, bare at low water. Shoals extend 100 to 300 yards off the Whidbey Island shore.

Along the shore of Whidbey Island, between it and the edge of the flats, is a natural channel varying in width from 0.2 to 0.5 mile, except at Hope Island, where it narrows to 150 yards. The channel is marked with lights and buoys from Deception Pass to the N entrance of Saratoga Passage. The main channel from Deception Pass S through Skagit Bay has depths of 6 fathoms or more.

Velocity and direction of the current vary throughout this channel. The flood current enters through Deception Pass and sets in a generally S direction. The ebb flows in a general N direction. SW of Hope Island, the velocity is 2.3 knots on the flood and 2.0 knots on the ebb. S of Goat Island the velocity is 1.8 knots on the flood and 1.4 knots on the ebb. N of Rocky Point the velocity is 0.6 knot on the flood and 1.0 knot on the ebb. (See the Tidal Current Tables for predictions.)

Similk Bay, at the N end of Skagit Bay, is used for log-rafting operations and is unsafe for navigation. **Skagit Island** and **Kiket Island,** 111 feet and 194 feet high, respectively, are just S of Similk Bay opposite the E entrance to Deception Pass. **Hope Island,** 1 mile S of Skagit Island, is fringed with rocks off its E side, and marked by a light on its W point. **Ben Ure Spit,** across the channel from Hope Island, is a low projecting point within a shoal extending about 350 yards E.

Good anchorage may be had N of Hope Island, and vessels at times make use of this anchorage area while waiting for slack water in Deception Pass.

The narrow channel E of Hope Island is used by small craft with local knowledge. This channel, with a controlling depth of 5 fathoms, passes 130 yards off the Hope Island shore. The bottom is rocky and very irregular, and numerous dangers marked by heavy kelp are between the channel and the Fidalgo Island shore. A summer anchorage for pleasure craft is S of **Snee-oosh (Hunot) Point.**

Seal Rocks, 1.4 miles S of Hope Island, are on the E side of the main channel. They are marked by a light.

Swinomish Channel is a dredged channel that connects the waters of Skagit Bay with those of Padilla Bay, about 10 miles to the N. The entrance channel from Skagit Bay leads ENE between two jetties, thence N of **Goat Island,** which is rocky, steep, and timber covered, thence through **Hole in the Wall,** in the S part of Fidalgo Island, and thence N to Padilla Bay. The S jetty, submerged except for a small section near Goat Island, extends about 0.6 mile W of Goat Island and is marked by daybeacons; the N jetty, submerged and marked by a light off its W end, extends W about 1.1 miles from the S end of Fidalgo Island. A **072°-252° lighted range** marks the entrance channel from Skagit Bay, and other navigational aids mark the channel to Padilla Bay. In September 1981, the centerline controlling depth was 7 feet from Skagit Bay to deep water in Padilla Bay.

Several bridges and overhead power and telephone cables cross Swinomish Channel; minimum clearance of the power cables is 72 feet. Just S of La Conner, the highway fixed bridge has a clearance of 45 feet or 75 feet for a center width of 310 feet. At the Padilla Bay entrance, the railroad swing bridge has a clearance of 5 feet, and about 0.2 mile S the highway lift bridge has clearances of 16 feet down and 78 feet up. The railroad span is left in the open position until trains approach. A fixed highway bridge with a clearance of 75 feet crosses the channel about 100 yards S of the highway lift bridge. In 1980, a fixed highway bridge with a design clearance of 76 feet was under construction immediately N of the aforementioned fixed highway bridge. When completed it will replace the highway lift bridge.

Most of the yachts going between Bellingham and Seattle prefer Swinomish Channel to Deception Pass because of the calmer water and shorter run. The channel is used extensively for towing logs.

La Conner, near the S end of Swinomish Channel, is the center of a rich agricultural district, and has several fish canneries. Many commercial fishing boats operate from here. Piers, wharves, and mooring floats are along the entire waterfront, much of which is bulkheaded. There are several marinas along the channel at La Conner. The largest marinas are operated by Skagit County in the county basins on the E side of the channel about 0.6 mile and 0.8 mile N of the highway fixed bridge. The entrance to the S basin is constricted by pilings that extend from the N side. The S basin has about 180 covered and uncovered berths with electricity and water, and a 40-ton mobile hoist at its N end. The hoist is used jointly by the marina and a machine shop on the N side of the S basin. Complete hull and engine repair facilities are available at the machine shop. Gasoline, diesel fuel, dry storage and marina supplies are available at several marinas in the area. A firm, on the E side of the channel at the S end of town, builds fiberglass boats and does limited hull repair work. A tug company, just N of the S basin, has tugs up to 2,400 hp available. An extensive log storage and sorting yard is on the W side of the channel opposite the tug company. Logs are moored along both sides of the channel near the storage yard.

Guemes Channel, between Guemes Island on the N and Fidalgo Island on the S, leads E from Rosario Strait to Padilla Bay. The channel, which is about 3 miles long and 0.5 mile wide at its narrowest point, has depths of 8 to 18 fathoms; the main part of the channel has been wire-dragged to depths of more than 33 feet. Lighted buoys mark the channel at the W end.

Local magnetic disturbance.–Differences from normal variation of as much as 14° have been observed off the SE point of Guemes Island.

Shannon Point, the S point at the W entrance of Guemes Channel, is low and rounding, and marked by a light and fog signal. A shoal extends 200 yards N from the point.

The current velocity in Guemes Channel exceeds 5 knots at times. It is reported that the flood (E current) is accompanied by an eddy between the E end of Guemes Island and Cap Sante with the W countercurrent extending about 200 yards from the shore along the N side of Fidalgo Island. (See the Tidal Current Tables for predictions.)

Ship Harbor is a bight close E of Shannon Point, at the W entrance to Guemes Channel. The interisland ferry slips and headquarters are here. Vessels anchoring here in heavy weather should be cautious of dragging anchor because the bottom is not good holding ground.

City of Seattle Rock, covered 1½ fathoms, is 200 yards offshore on the S side of the channel, 2 miles E of Shannon Point.

Anacortes, on the S shore of Guemes Channel, is a fishing and lumber center with two salmon canneries, and a pulpmill and a plywood plant. The port is incorporated as the **Port of Anacortes.** Commerce includes logs and lumber products, seafoods (including salmon), petroleum products, and farm produce.

The most prominent charted landmark in the area is a tall, abandoned stack standing on bare ground about 0.5 mile NW of the entrance to Cap Sante Waterway.

Cap Sante (Capsante) Waterway, a dredged channel leading to the E waterfront of Anacortes, is marked by a lighted range, daybeacons, and lights. The ends of the breakwaters forming the boat haven are marked by lights. In March 1980, the centerline controlling depth from deep water in Fidalgo Bay to the mooring basin was 7 feet with depths of 7 to 11 feet in the basin. The Port of Anacortes controls the boat haven. There are berths, with electricity and water, for about 400 craft; transient berths are available. A **harbormaster** assigns berths. A marina at the basin operates a fuel dock at which gasoline and diesel fuel are available. Water, ice, supplies, and a 30-ton lift that can handle vessels to 55 feet long, are available at the marina. Hull, engine, and electronic repairs can be made at the marina. A Coast Guard vessel is stationed at Cap Sante Boat Haven.

A dredged channel, marked by lights and buoys, extends about 0.7 mile SW from the entrance to Cap Sante Waterway to the waterfront area of Anacortes Industrial Park. In March 1980, the channel had a controlling depth of 16 feet. In 1980, about 1,500 feet of berthing space with 25 feet alongside was reported available; the industrial park had no special equipment or facilities.

Anchorage.–Anchorage is reported available in 8½ to 10 fathoms about 0.8 mile ENE from Cap Sante Waterway Light 2.

Tides.–The mean range of tide at Anacortes is 4.8 feet, and the diurnal range of tide is 8.2 feet.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Anacortes from the Puget Sound Pilots or the Washington Pilots Association. (See Pilotage at the beginning of this chapter for details.)

Towage.–Tugs are not available in Anacortes, but may be obtained on advance notice from Bellingham or Seattle.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Anacortes is a **customs port of entry.**

Harbor regulations.–The port is controlled by a port commission and a manager, whose office is on the port wharf at the foot of Commercial Avenue.

Wharves.–The Port of Anacortes operates two deep-draft wharves. For a complete description of the port facilities refer to Port Series No. 37, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported depths. (For information on the latest depths contact the port authorities.) Water is available at both port wharves; however, electricity is available only at the Commercial Avenue general cargo terminal.

Commercial Avenue Wharf (48°31'20"N., 122°36'40"W.): 580-foot berthing space; 29 to 31 feet alongside; deck height, 16 feet; 86,900 square feet covered storage, 4½ acres open storage; forklifts; one 1½-ton mast-and-boom derrick, one crawler crane; receipt and shipment of general cargo, shipment of dry bulk commodities. A private fog signal is on the wharf.

Log Handling Wharf (48°31'20"N., 122°36'24"W.): 1,020-foot berthing space with dolphins; 35 feet alongside; deck height, 16 feet; 8 acres open storage; shipment of logs. The wharf is marked on each end by a private light.

Note: Considerable current sets along the faces of these wharves (E flood, W ebb); it is advisable to dock against the current.

Supplies.–Fuel oil is available at the refinery piers at March Point. Chevron Oil Co. Wharf, adjacent W to Commercial Avenue Wharf, has diesel fuel and gasoline for small craft. Gasoline, diesel fuel, and other small-craft supplies may be obtained at the port boat haven. Ice and marine supplies are available in the city.

Repairs.–The largest repair facility in the area is the repair yard just W of the port's log handling wharf. The yard has two marine railways, the largest of which can handle vessels up to 150 feet and has a nominal load rating of 500 tons, but generally handles a maximum of about 250 tons. Machine and carpentry shops are available at the yard, and complete hull and engine repairs can be made. A smaller repair yard, about 200 yards E of the larger yard, has a 50-ton crane that can handle vessels to 40 feet, and a marine railway that can handle vessels to 50 tons, 65 feet long, and 7 foot draft; complete hull and engine repairs can be made. A marina on the E waterfront of Anacortes has a mobile lift of 25 tons or 55 feet capacity for complete hull and engine repairs. A repair facility about 1.5 miles E of Shannon Point has a 400-ton marine railway.

Communications.–The city is served by a spur of the Burlington Northern Railroad. A State highway connects the city to Interstate 5. Ferry service is maintained to Guemes Island and to the San Juan Island, with connections to Sidney on Vancouver Island, B.C.

Fidalgo Bay, a shallow arm of Padilla Bay, extends S from the E end of Guemes Channel.

Padilla Bay, between the mainland and the N part of Fidalgo Island, is largely occupied by drying flats, but deep water is E of Anacortes and Guemes Island. Entrance to the bay from Rosario Strait is through Guemes Channel; a passage E of Guemes Island leads into Padilla Bay from the N.

March Point, low and wooded, is the peninsula between Fidalgo and Padilla Bays. The two long Shell and Texaco Oil Co. Refinery piers extend N to deep water from the N end of the point. The W pier, owned by Texaco, Inc., has a 7,150-foot approach trestle, deck height of 22 feet, and is marked at the E and W ends by private lights. The N side of the pier has 1,130 feet of berthing space with dolphins and depths of 45 feet alongside; the S side of the pier has 551 feet of berthing space with dolphins and depths of 44 feet reported alongside. The Shell Oil Co. Pier, 0.5 mile E of the Texaco Pier, has a 3,466-foot approach trestle, deck height of 22 feet, and is marked at the E end by a private light and at the W end by a private light and fog signal. The N side of the pier has 810 feet of berthing space with dolphins and depths of 45 to 47 feet reported alongside; the S side of the pier has 756 feet of berthing space with dolphins and depths of 40 to 45 feet reported alongside.

About 200 yards from the Shell Oil Co. Pier, when making a starboard landing, a vessel is set by the current onto the pier and great care must be taken to avoid being set hard onto the pier. The use of an anchor in docking is advisable. The current is at times pronounced when docking at the inside berth, and care must be taken to avoid being set onto the shoal to the S. Less current is generally experienced at the Texaco Pier; however, the use of an anchor is recommended when making a starboard landing.

Local magnetic disturbance.–Differences from normal variation of 2° have been observed in the vicinity of March Point.

Bay View, a village across the flats of Padilla Bay ESE from March Point, has no facilities except for a small boat repair shop.

Chart 18424.–William Point, 100 feet high, is the W point of **Samish Island,** which forms the N side of Padilla Bay. The point is wooded and, because of the low land E of it, appears as an island although it is connected with the mainland. It is marked by a light.

Bellingham Channel, deep between Cypress and Guemes Island, is the most direct route to Bellingham Bay from S. Between Cypress, Guemes, and Sinclair Islands the tidal currents have considerable velocity, but between Sinclair and Vendovi Islands the velocities are considerably less.

A light is on the W side of Bellingham Channel off the E side of Cypress Island. **Cone Islands,** a group of five islets on the W side of Bellingham Channel, are 0.4 mile E of the NE side of Cypress Island.

Clark Point, on the E side of Bellingham Channel, is a steep bluff forming the N point of Guemes Island. A reef extends 300 yards N from the point. A marina, about 1.6 miles SE of Clark Point, has gasoline. A launching ramp and a hoist that can handle small craft to 18 feet is available. **Vendovi Island** is 1.8 miles NE of Clark Point. Shoaling to 4 fathoms, 0.4 mile SW of Vendovi Island, is marked by a buoy. A light marks the E side of the island. A private light is in a small cove on the NW side of Vendovi Island.

Deep-draft vessels approaching Bellingham Bay from N use the channel between Lummi and Sinclair Islands. With the exception of Viti Rocks and the dangers N of Sinclair Islands, this channel is free of danger. The fairway is deep and has a width of 0.6 mile at its narrowest part, between **Viti Rocks** and **Carter Point,** the S tip of Lummi Island. The northwesternmost Viti Rock is 35 feet high, 200 yards long, and marked by a light.

Hale Passage, 6 miles long, separates Lummi Island from the mainland to the NE. Depths in the passage vary from 2 fathoms on the bar near the NW end to 20 fathoms in the SE end of the channel.

Lummi Point, on the W side of Hale Passage 1.5 miles SE of Point Migley, is marked by a lighted buoy. A light is on the E side of Lummi Island 3 miles SE of Lummi Point.

Lummi Island, a village on the W side of Hale Passage, is 1 mile S of Lummi Point. The village and island are linked to the mainland at **Gooseberry Point** by an automobile ferry. The ferry dock at Lummi Island is marked by a private light and fog signal. A pier, adjacent to the ferry slip at Gooseberry Point, has a 6-ton hoist that can handle craft 28 feet long; gasoline, water, ice, marine supplies, and hull and engine repairs are available. Depths of 4 feet are reported off the end of the pier at the hoist.

From **Point Francis,** the rounded high bluff at the SE entrance of Hale Passage, a shoal and broken ground extend SSE to Eliza Island. The depths range from 5 to less than 1½ fathoms about midway between the point and the island. A lighted buoy is about 300 yards S of the 1½ fathom spot.

Bellingham Bay, from William Point to the head, is about 12 miles long and 3 miles wide. Anchorage may be obtained almost anywhere in the bay S of the flats; the depths, over the greater portion, range from 6 to 15 fathoms. Because of the mud bottom, vessels are apt to drag anchor in heavy weather.

Samish Bay, separated from Padilla Bay by Samish Island, with flats bare for a considerable distance at low water, forms the SE part of Bellingham Bay. Extensive oyster culture is carried on in the E portion of the bay.

Eliza Island, low and partly wooded, is 1 mile NE of Carter Point. Shoals fringe most of the island, which should not be approached closer than about 400 yards. A rock covered 1 fathom is some 500 yards N of the W tip of the island.

Vessels anchoring between Lummi Island and Eliza Island during heavy weather should be cautious of dragging anchor because of the poor holding ground.

Eliza Rock, marked by a light, is off the S end of Eliza Island.

Chuckanut Bay, which indents the E shore of Bellingham Bay, is a cove affording shelter to small craft. A rock ledge, covered 3 feet, is reported just S of **Chuckanut Island** in about 48°40.5'N., 122°30.1'W. The small-craft launching ramp of **Larabee State Park** is at **Wildcat Cove,** 0.6 mile SE of **Governors Point** at the SW entrance to Chuckanut Bay.

Post Point, on the NE side of Bellingham Bay, is 1.5 miles NNW of the N entrance point of Chuckanut Bay. A shoal, marked by a lighted bell buoy, extends about 450 yards W from the point. **Starr Rock,** covered 1 fathom, is about 200 yards offshore, 0.5 mile SSW of Whatcom Waterway Light 2; it is marked by a buoy. Vessels should not pass inside the buoy.

A **037°06'–217°06' measured course,** 3,038 feet long, is about 1 mile NE of Post Point off the entrance to Whatcom Creek Waterway. The N and S front markers are 500 yards E and 700 yards S, respectively, of Starr Rock, and the rear markers are about 20 yards SE of the front markers. All are yellow wooden triangular daymarkers with a black stripe.

Bellingham is at the head of Bellingham Bay on the E shore. Wood and wood products including pulp, aluminum, chemicals, and general cargo are shipped out; salt, alumina, and general cargo are imported. A large pulpmill is just NE of the port wharves at Bellingham, and an aluminum smelter is at Ferndale. These mills have their own wharves, but use the port facilities to ship and receive some of their material.

The S terminal of the Port of Bellingham, a cannery, and a boatbuilding plant are on the N side of Post Point at **South Bellingham.** A seafood plant is on the I and J Street Waterway; fishing boats unload at its wharf. The areas on both sides of the waterway channel are used for log storage. There are several other seafood wharves, oil docks, and other commercial facilities around the harbor.

Whatcom Creek Waterway at the SE end of Bellingham Harbor, **Squalicum Creek Waterway** at the NW end of the harbor, and **I and J Street Waterway** in between, provide dredged channel access to the port facilities at Bellingham. Bellingham Yacht Harbor is adjacent to and SE of Squalicum Creek Waterway; the yacht harbor is described later in this chapter.

Prominent features.–Particularly prominent at night is the lighted sign HERALD on the newspaper building. Also prominent are the water tank on top of the tall B & B Furniture Co. building, the stack at the cement plant 1.9 miles NW of Whatcom Creek Waterway Light 2 and the stack 0.3 mile to the E, and the church spire near the Bellingham waterfront.

Channels.–A Federal project provides for a depth of 30 feet in Whatcom Creek Waterway to within 250 yards of the bridge, 26 feet in Squalicum Creek Waterway, and 18 feet in I and J Street Waterway. Depths in Whatcom Creek Waterway are usually near project depth to the port wharf; the controlling depth for Middle and Inner Reach of this waterway may be considerably less than project depth. The controlling depth for Squalicum Creek Waterway and I and J Street Waterway may also be considerably less than project depth. (See Notice to Mariners and latest editions of the chart for controlling depths.) Squalicum Creek Waterway is marked by lights, and I and J Street Waterway is marked by lights and a daybeacon. Whatcom Creek Waterway is marked by lights and a lighted range. The **Port of Bellingham** assists the Federal Government in dredging and maintaining channel depths. The port authority maintains depths of more than 30 feet alongside the Whatcom Creek Waterway port wharf, and also dredges the small-craft basin.

Anchorages.–The bottom mud is a thin accumulation over hardpan, and is not good holding ground in heavy weather. A **general anchorage** and an **explosives anchorage** are in the bay. (See 110.1 and 110.230 (a) (1a and 1b) and (b), chapter 2, for limits and regulations.)

Tides.–The mean range of the tide at Bellingham is 5.2 feet, and the diurnal range of tide is 8.6 feet. A range of about 14 feet may occur at the time of maximum tides.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Bellingham from the Puget Sound Pilots or the Washington Pilots Association. (See Pilotage at the beginning of this chapter for details.)

Towage.–Tugs to 1,270 hp are available at Bellingham, and larger tugs at Seattle. Arrangements for tugs should be made in advance through ships' agents. Tugs monitor and use as a working frequency VHF-FM channel 7 (156.35 MHz).

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Bellingham is a **customs port of entry.**

The Coast Guard maintains a **vessel documentation office** in Bellingham. (See appendix for address.) A Coast Guard station is at Squalicum small-boat harbor.

Harbor regulations.–The city fire chief is responsible for the prevention of hazardous fire conditions in the harbor. The Port of Bellingham directs the operation of the North Terminal on Whatcom Creek Waterway, the South Terminal at Post Point, and the yacht harbor E of Squalicum Creek Waterway. The port's general offices are at the North Terminal.

Wharves.–The Port of Bellingham operates two deep-draft terminals, one at South Bellingham and one on Whatcom Creek Waterway. In addition, there are several privately owned deep-draft piers and wharves on Whatcom Creek Waterway and numerous medium-draft piers and wharves used for loading or offloading petroleum products, logs, sand and gravel, or fish, or for mooring vessels. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 37, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths of the facilities described are reported depths. (Contact the Port of Bellingham or the private operator for the latest depths.)

Port of Bellingham North Terminal, Main Wharf: The outer wharf on the SE side of Whatcom Creek Waterway; 1,255-foot berthing space at face with 32 feet alongside, 400-foot berthing space at SW inside berth with 30 feet alongside; deck heights, 16 feet; 45,840 square feet covered storage, 12 acres open storage space, salt storage pad; two traveling revolving gantry cranes certified at 50 tons, 14 log lift trucks, the largest of which has a capacity of 7½ tons; a clamshell bucket unloads salt at the wharf where it is transferred to a salt storage pad by a 36-inch conveyor belt; receipt and shipment of general cargo, receipt of bulk salt, chemicals, shipment of alumina, logs and wood products, and pulp and pulp products; owned and operated by the Port of Bellingham.

Note: Vessels moor starboardside-to all berths; if a tug is not furnished, the use of an anchor in docking is recommended when winds prevail. Vessels backing out of the Whatcom Creek Waterway channel must stay in the axis of the channel until abeam of Starr Rock Buoy to avoid shoal water on either side.

Car Float Slip: just inshore from main wharf; a three-track railroad wharf; depth alongside, 20 feet; transfer of railroad cars to and from car floats; owned and operated by the Port of Bellingham.

Chemical Wharf: 150-foot berthing space with S dolphins; 100-foot berthing space with N dolphins; depth alongside, 20 feet; overhead pipelines lead to storage tank farm at rear of facility, total tank farm capacity 6 million gallons; shipment of bulk liquid chemicals by barge; owned and operated by the Port of Bellingham.

Port of Bellingham South Terminal (48°43'22"N., 122°30'41"W.): E side, 400-foot berthing space; 9 to 32 feet alongside; deck height, 15 feet; W side not used; three smaller piers W of the main pier have depths of 1 to 30 feet alongside and deck heights of 17 feet; the barge dock E of the pier has a 150-foot berthing space with dolphins; 12 feet alongside; deck height, 15 feet; 173,000 square feet covered storage, 8 acres open storage; receipt of fish, shipment of canned fish; in 1973, the port planned to replace the existing main pier at the South Terminal with a modern concrete pier; owned and operated by the Port of Bellingham.

Georgia-Pacific Corp. Wharf (48°44'57"N., 122°29'15"W.): 1,110-foot berthing space with dolphins; 26 to 30 feet alongside; deck height, 21 feet; one 6-ton fixed, revolving hammerhead crane and a conveyor system for unloading wood chips and hogged fuel; 42,000 square feet covered storage; forklift trucks, 2 mobile cranes; receipt of wood chips, hogged fuel, fuel oil, and chemicals; shipment of wood pulp and chemicals; owned and operated by Georgia-Pacific Corp. **Note:** Vessels docking with the assistance of a tug should use an anchor. Shoal water is at the NE end of the wharf.

A large cold storage plant and several seafood facilities are on the E side of Squalicum Creek Waterway. Fishing boats and an occasional ship unload fish in the area. A plywood mill is on the W side of the waterway.

Supplies.–Complete marine supplies are available for small craft, and some for large vessels. Fuel oil is available by barge from Seattle.

Repairs.–There are no facilities for major repairs to large oceangoing vessels in Bellingham; the nearest such facilities are in Seattle, Wash., or Vancouver, B.C. Complete repair facilities are available for small craft. A propeller works, several machine shops, engine and deck-gear suppliers, and an electronic repair company are along the Bellingham waterfront. The larger of two repair yards is just W of the Port of Bellingham South Terminal. This yard has a machine shop and a marine railway that can handle vessels up to 200 tons, 120 feet long, or 32 feet wide for hull repairs. Another repair yard, at Squalicum Boat Harbor, has a marine railway that can handle vessels up to 150 tons, 86 feet long, or 26 feet wide for hull repairs. Several local machine shops in the area do engine repair work for the two repair yards.

Squalicum Boat Harbor, adjacent to and SE of the Squalicum Creek Waterway, is protected by breakwaters on its SE and SW sides. The harbor can be entered from the SE between the two breakwaters, or from the NW from the Squalicum Creek Waterway. The channelward ends of the breakwaters at the SE entrance are marked by lights; a fog signal is sounded from the southernmost light. The entrance from the Squalicum Creek Waterway is also marked by two lights. Depths inside the harbor are 10 to 15 feet.

Berths for about 600 pleasure craft and fishing boats are in the harbor. A guest float is maintained near the **harbormaster's** office on the NE side of the harbor. Gasoline, diesel fuel, electricity, water, ice, and marine supplies are available. Several marine equipment repair and fishing supply firms are in the area N of the SE entrance to the harbor.

Communications.–Bellingham is served directly by one major railway and has connections to another. It is on U.S. Interstate Highway 5 and is a hub for three State highways. The airport is about 2.5 miles NW of the city.

Chart 18400.–The **Strait of Georgia** extends some 115 miles NW from its S end, in the vicinity of Alden Bank, and is bordered on the W by Vancouver Island, B.C., and on the E by the mainland of Canada. General depths are great and in many places exceed 200 fathoms.

Vessels bound to the Strait of Georgia from Puget Sound should give the SW shore, between Boundary and Active Passes, a berth of at least 2 miles because it is fringed with dangers. Point Roberts, on the N shore, affords an excellent landmark.

(See the beginning of this chapter for regulations governing vessels transiting gill net fishing areas.)

A **Vessel Traffic Service** has been established in the Strait of Juan de Fuca, E of Port Angeles, and in the adjacent waters. (See 161.101 through 161.189, chapter 2, for regulations, and the beginning of this chapter for additional information.)

Currents.–The tidal currents in the Strait of Georgia are not nearly as strong as those in the channels leading to it from the Strait of Juan de Fuca. The currents in the Strait of Georgia attain a velocity of 3 knots at times, particularly during the freshets of the summer, when the Fraser River discharges a large volume of freshwater. This freshwater, which has a peculiar milky color, flows across the banks at the mouth of the river and almost directly toward Active Pass. Frequently this water extends entirely across the strait and at times reaches into the inner channels along the shore of Vancouver Island; at other times, it reaches only to the middle of the strait and forms a striking contrast with the deep blue water of the Strait of Georgia.

In the middle of the strait N of Patos and Saturna Islands, the velocity of the current varies from 1 to 3 knots, seldom exceeding the latter. The velocity is still less NW of the mouth of the Fraser

River, where the strait is about 15 miles wide. The tidal currents SE of the mouth of Fraser River are slightly stronger off the S shore than off the N shore. The currents within a line joining Point Roberts and Sandy Point are scarcely felt, and vessels can take advantage of this, expecially since good anchorage can be obtained in this vicinity.

The tidal currents are stronger close to the S shore which is swept by the rapid currents out of Active, Porlier, and Gabriola Passes. The southgoing tidal current in the Strait of Georgia sets strongly SW into Active Pass.

Winds and Visibility.–In the open waters of the Georgia Strait, winds are usually either northwesterlies or southeasterlies. Southeasterlies are more frequent from October through March. Close to the British Columbia coast, they are often deflected and become easterlies. While the Georgia Strait is somewhat sheltered from the sea by the mountains of Vancouver Island, gales still occur three or four times per month. While some are associated with the intense storms of winter, particularly dangerous gales occur in clear weather. These are locally known as **Squamish winds.** They occur periodically in most of the main inlets in winter. They come up suddenly and may exceed 50 knots. Squamishes occur when a vast pool of very cold air accumulates on the interior plateau of British Columbia. A pressure fall at sea will trigger a movement of this air toward the coast. This flow is intensified by the direction and narrowness of the inlets. As the air reaches the mouths of these inlets, it spreads out over the strait and wind speed diminish. Winds rarely remain strong 15 to 20 miles away. Howe Sound, Jervis, Toba, and Bute Inlets all experience squamishes each winter.

In summer, winds in the Rosario and Haro Straits are usually southwesterlies. Summer breezes are variable and baffling in the San Juan Islands. N of Point Roberts, in the middle of the Georgia Strait, the prevailing winds are northwesterlies. Gales are uncommon, particularly in midsummer, when storm activity reaches a lull.

Georgia Strait is more affected by land fogs than sea fogs. These fogs form on cool nights under clear skies and light winds, and usually dissipate by early afternoon. These conditions are most prevalent from September through February. During prolonged periods of cold, clear, calm weather, these fogs may persist for several days at a time. Land fog is more local than sea fog. Visibilities fall below 0.75 mile on about 20 days annually, but this can increase to 60 days in preferred locations like the flat land in the delta of the Fraser River where the low water temperatures of the river help produce the fog.

Charts 18421, 18424, 18431.–Sandy Point, about 2.5 miles N of Lummi Island and at the NW side of **Lummi Bay,** is the site of an extensive housing development fronting a privately dredged basin. A marina with fuel dock is in the basin. A light and daybeacon are off the entrance to the basin. In 1973, it was reported that a depth of about 6 feet could be carried to the fuel dock. Gasoline, water, and a 1½-ton hoist are available at the marina.

Between Sandy Point and **Cherry Point,** about 4.5 miles NW, the shore of the mainland forms a bight in which there are no off-lying dangers. The piers of two large oil refineries and an aluminum smelter are in the bight. A **general anchorage** is off Cherry Point. (See 110.1 and 110.230(a)(14), and (b), chapter 2, for limits and regulations.)

The 1,800-foot pier of the Mobil Oil Co. refinery is at **Ferndale,** 2.4 miles N of Sandy Point. The L-shaped pier has 756 feet of berthing space and reported depths of 42 feet at the outer face, and 685 feet of berthing space and depths of 35 feet at the inner face. Deck height is 18 feet. The pier is used for the receipt of crude oil and shipment of petroleum products, and for bunkering vessels. The pier is marked by private lights and a fog signal. An oil refinery tower 0.8 mile inshore is prominent. **Note:** A portside-to landing is preferred when docking at the outer berth during S winds and a flood tide; the use of an anchor is advisable.

The long loading wharf and pier of the Intalco Aluminum Corp. is 0.8 mile N of the Mobil Oil Co. pier and 3.2 miles N of Sandy Point. The wharf has 950 feet of berthing space with dolphins and depths of 38 feet alongside. Deck height is 22 feet. The wharf is used for the receipt of alumina and the shipment of refrigerated propane gas. Private lights and a fog signal are on the wharf, and two private lighted mooring buoys are just off the wharf. **Note:** Vessels normally dock starboardside-to; however, a portside-to landing is required for vessels having their bridge forward of a cargo hold and with less than 30 feet between the hold and the rear of the pilothouse.

The Atlantic Richfield Co. Pier with a 2,400-foot angular approach trestle is at Cherry Point, about 4.5 miles NNW of Sandy Point. The pier has 960 feet of berthing space at the face with dolphins, and reported depths of over 65 feet alongside. Deck height is 22 feet. The dolphins are marked by private lights. The facility is used for receipt of crude oil, shipment of petroleum products, and bunkering vessels. **Note:** The pier has rigid loading arms for the transfer of liquid cargo; chicksan rigs are not required on vessels. Some vessels prefer to drag an anchor in approaching the pier; however, tugs are available on advance notice from Bellingham. Three oil boom deployment buoys are off the face of the pier, one on either end and one 600 feet off the center of the face of the pier. Water and electrical shore power connections are available. A special gangway is provided in lieu of the ship's gangway.

Point Whitehorn, about 2.8 miles NW of Cherry Point, is a conspicuous, bold bluff about 150 feet high; its seaward face is a steep cliff of white clay.

Birch Bay, on the E side of the Strait of Georgia between Point Whitehorn and **Birch Point,** is an open bight. It affords some protection, in 4 to 5 fathoms, from N, but is open to the SW. Flats that bare occupy a considerable area at the head of the bay. A number of resorts are along the shore; however, there are no facilities for small craft.

The **International Boundary** between the United States and Canada is marked by three sets of range lights where it crosses Semiahmoo and Boundary Bays. One set is in the E part of Semiahmoo Bay, and the other two sets are N of Point Roberts on the W side of Boundary Bay.

The **Peace Monument** on the boundary is a white masonry arch, facing N and S, about 28 feet above the ground. It is a distinctive landmark as it stands alone and shows offshore against a background of dark trees.

Caution.–The International Navigation Rules govern in all Canadian waters.

Point Roberts is the prominent feature in approaching from either N or S. The E face is about 180 feet high and is composed of white, vertical bluffs. The point is well wooded, and because of the low land behind it, is usually made as an island, especially from S. The SW extremity of the point is marked by a light. Extensive night drift-fishing in the area from Point Roberts to Blaine makes night navigation difficult.

Point Roberts is a **customs port of entry.**

Temporary anchorage may be obtained W of Point Roberts in 8 fathoms, good holding ground, about 1 mile 321° from Point Roberts Light. The position is about 0.3 mile from the edge of Roberts Bank; vessels should not anchor any farther N.

Semiahmoo Bay has its entrance between Birch Point and Kwomais Point, about 5 miles NNW. It is connected with Drayton Harbor by a narrow channel. The E part of the bay is shoal with extensive sand flats in the SE part. Anchorage may be had in the bay in 3½ to 9 fathoms on the NW side of Semiahmoo Spit, affording protection from S and SE storms.

Drayton Harbor is a small cove formed by **Semiahmoo Spit,** the extension of a sandspit N of Birch Point. It is about 2 miles long, but flats that bare at low water occupy a large area in the E and S parts of the harbor.

A light with fog signal and a buoy about 700 yards to the WSW are near the N end of the extensive sand flats off the NW side of Semiahmoo Spit.

The channel from Semiahmoo Bay to the cannery wharf on Semiahmoo Spit and to Blaine Harbor, E of the cannery wharf, has a controlling depth of about 21 feet; greater depths are possible with local knowledge. The 15-foot spot about 130 yards N of the cannery wharf, and the 9-foot spot about 300 yards E of the E end of the wharf should be avoided.

Blaine Harbor, at Blaine, is a large and well-equipped small-boat basin near the entrance on the N shore of Drayton Harbor. The harbor is an active fishing center operated by the Port of Bellingham. A light marks the outer end of the breakwater that protects the basin on the S side. In September 1981, depths through the entrance and in the basin were 11 feet except for shoaling along the edges. The harbor has berths for about 300 boats; 200 additional berths are being planned by the Port of Bellingham. A **harbormaster** is on duty in the harbor. Fish-processing plants and a fish reduction plant are in operation. Gasoline, diesel fuel, electricity, water, ice, launching ramp, dry storage facilities, and marine supplies are available in the harbor. A repair yard with a marine railway that can handle vessels to 200 tons, 80 feet long, or 21 feet wide is also available; hull repairs can be made. A depth of 2 feet has been reported at the entrance to the marine railway.

Storm warning signals are displayed. (See chart.)

Blaine, a small town on the NE shore of Drayton Harbor, is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

The United States-Canadian boundary line passes through the N edge of town. Interstate Highway 5 and the Burlington Northern Railroad serve the town.

The mean range of **tide** at Blaine is 5.9 feet, and the diurnal range of tide is 9.5 feet.

The average velocity of the **current** in Drayton Harbor entrance is 1.0 knot. The flood sets SE and the ebb NW.

Several buildings, an elevated tank, and a cannery constituting the town of **Semiahmoo,** are at the N end of the sandspit. Adjacent to the cannery is a marine railway for exclusive use of the cannery boats.

To enter Drayton Harbor and Blaine Harbor from Semiahmoo Bay, pass about 300 yards N of Semiahmoo Bay Light, and steer a course about midway between the cannery wharf and the Blaine Harbor boat basin taking care to avoid the 15-foot spot about 130 yards N of the cannery wharf. After passing the cannery wharf, favor the N side of the channel to avoid the 9-foot spot E of the E end of the cannery wharf, and the spit ESE of the cannery, and make Blaine Harbor or anchor as convenient in Drayton Harbor. Anchoring in the shoal water of Drayton Harbor is not recommended because the floating debris and vegetation may clog a vessel's underwater intakes.

The depths in Drayton Harbor and its entrance are subject to change.

Chart 18400.–Strait of Georgia, E shore (Canada).–Boundary Bay indents the mainland between **Kwomais Point,** the N entrance point of Semiahmoo Bay, and Point Roberts. The greater portion of the bay is filled with flats, bare at low water.

Anchorage in 5 fathoms with good holding bottom is available about 1 mile ENE of the SE point of Point Roberts, affording protection from W and NW storms.

Except for **English Bluff** about 1.5 miles N of **Boundary Bluff,** the coast N to Point Grey is low, featureless, and barely discernible from the Strait of Georgia.

A causeway extends about 1.8 miles SW from English Bluff and terminates in a ferry landing; a light and fog signal are at the landing. A breakwater, about 0.2 mile long and marked by a light at its W end, is just S of the ferry landing. Just NW of the ferry landing are the long pier and facilities used for bulk loading and export of coal by bulk carriers. These facilities, although operated by private interests, are owned by the Port of Vancouver.

Roberts Bank and **Sturgeon Bank** are formed by the alluvial deposits of the Fraser River. These banks dry in patches, and in places extend 4.5 miles offshore. They are steep-to: soundings of 50 fathoms will be found very close to the edge of the bank. Vessels proceeding along the edge of Roberts Bank should not bring the S extremity of Point Roberts to bear more than 114°.

The cooperation of ships' masters is requested to avoid navigating their vessels between the charted traffic separation scheme and Sturgeon Bank. This is in the interest of the fishing industry and the reduction of damage to nets and fishing vessels by ships passing close to the fishing ground.

Fraser River enters the Strait of Georgia about 10 miles NW of Point Roberts.

Caution.–The channels in Fraser River are constantly changing, and the aids to navigation that mark them are moved accordingly.

Pilotage for the Fraser River is discussed at the beginning of this chapter.

The main entrance to Fraser River is between the two lighted buoys W of Sand Heads Light, which is near the outer end of Steveston Jetty; a shorter jetty is on the S side of the main entrance. (See the Sailing Directions, British Columbia Coast (South Portion), Vol. I, for complete information on Fraser River and other Canadian waters.)

Steveston on **Lulu Island,** about 1.0 mile N of **Pelly Point,** the S entrance point to Fraser River, extends along the bank of the river for about 1 mile. Several canneries and wharves are here.

The tidal **currents** in Fraser River are affected by the weather in the Strait of Georgia, the rains, and the amount of water in the river. In the channel above Pelly Point during freshets, the flow, which may be checked by the rise of the tide, is almost continuously toward the mouth of the river. During the freshets the greatest velocity occurs 2 to 3 hours before low water and may amount to 5.5 knots. After the freshets are over, the greater velocity occurs on the average about 1½ hours before low water and is reduced to 3 or 4 knots. During the low stage of the river there is a flood and ebb on all the larger tides; the flood begins soon after high water and commences first along the bottom.

At New Westminster the flood current is unable to reverse the river current except in the autumn. The river is seldom frozen over here; loose pieces of ice, which do no damage to shipping, occasionally come down the river.

New Westminster is on the N bank about 20 miles above the entrance. Several canneries and sawmills are here, and a conspicuous grain elevator stands about 1 mile below the city, which now has grown into the expanded Vancouver suburbs. New Westminster Harbor is a major Canadian port. There are many wharves; most of them have warehouses and rail connections. Depths alongside range from 25 to 35 feet.

North Arm of Fraser River is entered 0.5 mile SW of Point Grey. Depths of 15 feet are maintained from the mouth to the NE extremity of Sea Island, and 10 feet from this point to Poplar Island. From Poplar Island (49°12′N., 122°56′W.), to the main river channel the depth is again 15 feet.

Point Grey, the S entrance point of **Burrard Inlet,** is a rounded bluff forming the W termination of a wooded promontory. The point is very conspicuous from S. The buildings of the University of British Columbia are conspicuous on the high land above the point. **Point Atkinson,** the N entrance point of Burrard Inlet, is comparatively steep-to. It is marked by a light, fog signal, and radiobeacon.

Tide rips occur frequently off Point Atkinson, caused by the meeting of the tidal currents from Burrard Inlet and Howe Sound.

Spanish Bank extends 0.6 mile N from the W half of the promontory terminating in Point Grey. The bank, which dries, is composed of hard sand and is steep-to. When submerged, there is nothing to indicate its position except near low water during strong W winds when it is marked by a line of small breakers.

Vancouver Harbor includes all the tidal waters in Burrard Inlet E of a line drawn from Point Grey to Point Atkinson. A secure, deep harbor, easily entered by the largest vessel, is formed between First and Second Narrows, and on its shores is the city of Vancouver, the third largest city of Canada and the commercial metropolis of British Columbia. A U.S. Immigration station is in the city. Complete marine supplies, repair facilities, and services for small craft and the largest ships are available.

The three principal anchorages in Vancouver Harbor are English Bay, the outer anchorage; Vancouver, above the first narrows; and in Indian Arm.

Chart 18421.–Strait of Georgia, W shore (Canada). The coast between East Point and Active Pass should be given a berth of at least 2 miles because it is fringed with dangers.

Belle Chain Islets is a narrow rocky ridge 2 miles long lying parallel with several islets and drying rocks along the NE shore of **Samuel Island.** Foul ground extends about 0.3 mile SE from **Edith Point,** the NE extremity of **Mayne Island.** A rocky patch with two heads, each of which covers 4 feet, is about midway between Edith Point and the NW end of Belle Chain Islets.

Chart 18400.–Salamanca Point, on the SE side of **Galiano Island,** is conspicuous from both SE and NW. The point is rocky, and the trees on it grow down nearly to the highwater mark.

Porlier Pass, 12 miles NW of Salamanca Point, separates Galiano Island and **Valdes Island** and connects **Trincomali Channel** with the Strait of Georgia. The pass has a minimum width of about 800 yards, but the navigable channel is narrow and the tidal currents attain velocities up to 9 knots. Current predictions may be obtained from the Tidal Current Tables. It is advisable to employ a pilot on the first visit to this pass.

Gabriola Pass is between the NW end of Valdes Island and Gabriola Island, connecting the NW end of **Pylades Channel** to the Strait of Georgia. This pass is not recommended for general navigation, but only for those with local knowledge. The velocity of the current in the pass is 4.0 knots, setting E on the flood and W on the ebb. The current may attain a velocity of 8 knots. (See the Tidal Current Tables for predictions.)

The outermost danger off Gabriola Pass, **Thrasher Rock,** a detached steep-to rock that dries, is 2.3 miles NE of the pass entrance. A light is on the rock. Shoreward of it are many rocks and reefs, including **Gabriola Reefs**; caution is essential.

Entrance Island, 0.4 mile N of Orlebar Point, the NE point of Gabriola Island, is marked by a light and fog signal. It is the guide to the entrance to **Nanaimo,** a Canadian port of entry. **Fairway Channel,** the easternmost of the channels in the N approach to Nanaimo, is deep and has a navigable width of 0.8 mile.

Off the entrance to **Nanoose Harbor,** 13 miles WNW of Entrance Island, there are many islets and reefs and, unless making for Nanoose, the navigator should keep 3 miles offshore until he raises the **Ballenas Islands** 5.5 miles NW of the Nanoose Harbor entrance.

Complete details of Canadian ports and features are given in Pub. No. 154, Sailing Directions (Enroute) for British Columbia, published by the Defense Mapping Agency Hydrographic/Topographic Center, and the Sailing Directions, British Columbia Coast, (South Portion) Vol. 1, published by the Canadian Hydrographic Service.

13. PUGET SOUND, WASHINGTON

This chapter describes Puget Sound and its numerous inlets, bays, and passages, and the waters of Hood Canal, Lake Union, and Lake Washington. Also discussed are the ports of Seattle, Tacoma, Everett, and Olympia, as well as other smaller ports and landings.

COLREGS Demarcation Lines. The lines established for Puget Sound are described in 80.01, 80.1385, and 80.1390, chapter 2.

Chart 18440.–Puget Sound, a bay with numerous channels and branches, extends about 90 miles S from the Strait of Juan de Fuca to Olympia. The N boundary of the sound is formed, at its main entrance, by a line between Point Wilson on the Quimper Peninsula and Point Partridge on Whidbey Island; at a second entrance between West Point on Whidbey Island, Deception Island, and Sares Head on Fidalgo Island; at a third entrance, at the S end of Swinomish Channel between Fidalgo Island and McGlinn Island. Puget Sound was named by George Vancouver for Lieutenant Peter Puget, who explored the S end in May 1792. Deep-draft traffic is considerable in the larger passages, and small craft operate throughout the area. Unusually deep water and strong currents characterize these waters.

Navigation of the area is comparatively easy in clear weather; the outlying dangers are few and marked by aids. The currents follow the general direction of the channels and have considerable velocity. In thick weather, because of the uncertainty of the currents and the great depths which render soundings useless in many places, strangers are advised to take a pilot.

Vessel Traffic Service (Puget Sound), operated by the U.S. Coast Guard, has been established in the Strait of Juan de Fuca, E of Port Angeles, and in the waters of Rosario Strait, Admiralty Inlet, Puget Sound, and the navigable waters adjacent to these areas. (See 161.101 through 161.189, chapter 2, for regulations, and the beginning of chapter 12 for additional information.)

Regulations governing vessels transiting gill net fishing areas are given at the beginning of chapter 12.

Floating logs and **deadheads** or **sinkers** may be encountered anywhere in Puget Sound; caution should be exercised.

Anchorages.–General, explosives, and foul weather anchorages have been established. (See 110.1 and 110.230, chapter 2, for limits and regulations.)

Dangers. Restricted areas have been established. (See 207.750, chapter 2, for limits and regulations.)

The large tides of Puget Sound are very complex and variable; use of the Tide Tables is advised.

Currents.–The Tidal Current Charts, Puget Sound, Northern Part, show the direction and velocity of the tidal current for each hour of its cycle in the waterways of Puget Sound from Admiralty Inlet to Seattle. They are designed for use with the current predictions for Admiralty Inlet contained in the Tidal Current Tables. A similar publication, entitled Tidal Current Charts, Puget Sound, Southern Part, covers the sound from Seattle to Olympia.

In Admiralty Inlet and Puget Sound, the tidal currents are subjected to daily inequalities similar to those of the tides. Velocities of 2 to 7 knots occur from Point Wilson to Point No Point. In the more open waters of the sound S of Point No Point the velocities are much less.

At Point Wilson and at Marrowstone Point, slack water occurs from one-half to 1 hour earlier near shore than in midchannel.

In the winter, when S winds prevail, there is generally a N surface drift which increases the ebb current and decreases the flood current. This effect is about 0.5 knot between Nodule and Bush Points.

The tidal currents in the S entrance of Possession Sound are weak and variable.

Between Foulweather Bluff and Misery Point, the tidal currents have a velocity of about 0.8 knot, while in the S part of Hood Canal, the velocity is only about 0.5 knot; at times of tropic tides, however, the greater ebbs may attain velocities more than double these values.

The tidal currents have velocities up to about 6 knots or more in Agate Passage and in The Narrows.

Winds and Visibility.–Puget Sound is open to the N and S and protected to the W and E by mountains. Winds are mainly SE through SW from September through April and NW through N in late spring and summer. However, winter directions are still common in summer, as are summer directions in winter. From fall through spring, lows moving through or near the Puget Sound are responsible for the mainly S flow. Intense storms can generate sustained winds of 40 knots with 50-knot gusts over the area. These strong winds are almost always from a S direction. In the Seattle area, sustained winds of 56 knots and gusts of 60 knots have been recorded. Winds are strongest in winter and early spring, on the average. Also calm conditions are frequent in fall and winter, reflecting the lull between storm passages. In late spring and summer, winds flow into Puget Sound from the Pacific High. Often, winds are light and variable at night, then pick up to 8 to 15 knots during the afternoon, reflecting a sea breeze effect over the sound. Occasionally, a low or front will bring a return to a S flow during the summer, and these winds remain the strongest, on the average.

Fog in the Puget Sound area causes visibility problems on about 25 to 40 days each year. It most likely hinders navigation in autumn and again during January and February. This fog is mainly a land type that forms on cool, clear, calm nights, drifts out over the water, then dissipates during the day. It can hang on for several days if a stagnant condition develops. Fog can form in any month, but is least likely during April and May.

Poor visibilities are encountered more often N and S of Puget Sound than in the sound itself. In Admiralty Inlet, fog signals at Point Wilson and Double Bluff and Point No Point blow about 8 to 15 percent of the time, during the late summer and fall. Fog lowers visibilities on this part of the coast to less than 0.5 mile on about 4 to 8 days per month. South of Point Robinson, in the East Passage, the fog signals operate about 8 to 15 percent of the time in fall and midwinter. In Puget Sound, fog signals, even during the heart of the season, blow less than 8 percent of the time; less than 5 percent in Elliot Bay. Waters of Point Wells and Point Pully are among the most fog free in the area; fog signals there operate just a few hours a month for most of the year. In the Seattle area, visibility falls below 0.5 mile on about 3 to 6 days per month during the foggy season.

Chart 18464.–**Point Wilson** is the W point at the entrance to Admiralty Inlet and Puget Sound.

Point Wilson Light (48°08.7'N., 122°45.2'W.), 51 feet above the water, is shown from a white octagonal tower on a building on the E extremity of the low point. A radiobeacon and fog signal are at the station.

Shoals extend 0.5 mile NW of Point Wilson to the 5-fathom curve over irregular bottom; these are generally indicated by kelp. The E edge of the shoals rises rather abruptly from deep water. Heavy tide rips extend N of these shoals, being especially heavy with a W wind and ebb current. A buoy marking the shoals is about 0.7 mile NW of Point Wilson Light.

In approaching Point Wilson in thick or foggy weather, especially if the fog signal is not heard, vessels should obtain soundings constantly.

Fort Worden, formerly an Army base about 0.6 mile SSW of Point Wilson, is a State Park. An unused 438-foot pier in good condition, with reported depths of 14 feet and shoaling along the face, is located here.

Port Townsend, immediately S of Point Wilson, is entered between Point Hudson and Marrowstone Point. It extends in a general SSW direction for 2.5 miles, and then turns SSE for 3 miles, with a reduced width to its head. Inside Point Hudson, depths generally range from 5 to 20 fathoms. It is an excellent harbor with good anchorage throughout and is easily entered. The prevailing winds in summer are from W to SW, and in winter are generally in the SE quadrant.

The large pulpmill at **Glen Cove,** on the W shore of Port Townsend, emits a continuous whitish smoke, which acts like fog, but is more persistent. At times the visibility in Admiralty Inlet is reduced to about 0.5 mile by the smoke as far N and W as Dungeness with E winds, and as far S as Point No Point with N winds. The smoke has a characteristic sulfurous odor. Visibility is particularly reduced when natural fog occurs at the same time.

Point Hudson, on the W shore 1.7 miles SSE of Point Wilson, is low and sandy. It is marked by a light and fog signal. The outer limits of the shoal making out from the point are marked by a lighted bell buoy NE of the light.

Marrowstone Point, the E point at the entrance to Port Townsend, is low at its extremity, but rises abruptly to a bluff about 120 feet high. The buildings of the former Fort Flagler, now a recreation area of the Washington Parks system, are about 0.5 mile to the S. The fort pier, with depths of about 20 feet at its face, is in poor condition. **Marrowstone Point Light** (48°06.1'N., 122°41.2'W.), 28 feet above the water, is shown from a 20-foot white square structure on the E edge of the point; a fog signal is at the light. Piling of former piers and anchor piling for wartime submarine nets extend up to 500 yards offshore 0.6 and 1.6 miles W of the light.

Midchannel Bank, covered 4¾ to 10 fathoms, extends NW from Marrowstone Point about 2 miles toward Point Wilson.

Port Townsend, the principal town, is on the W shore immediately W of Point Hudson. The depths at the wharves range from 12 to 20 feet along the faces. The only commercial traffic, other than fishing boats and occasional oil barges, is at the large Crown Zellerbach papermill SW of the town at Glen Cove.

Anchorage.–The usual anchorage is about 0.5 to 0.7 mile S of the railroad ferry landing in 8 to 10 fathoms, muddy bottom. In S gales better anchorage is afforded closer inshore off the N end of Marrowstone Island or near the head of the bay in moderate depths, muddy bottom. Two **explosives anchorages** are in the bay. (See 110.1 and 110.230 (a)(2), and (b), chapter 2, for limits and regulations.)

Tides.–The mean range of tide at Port Townsend is 5.2 feet, and the diurnal range of tide is 8.4 feet. Because of the large daily inequality in this vicinity there may be only one high water and one low water a day. Reference should be made to the Tide Tables which give daily tide predictions for Port Townsend.

Storm warning signals are displayed. (See chart.)

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Puget Sound from the Puget Sound Pilots or the Washington Pilots Association. (See **Pilotage,** chapter 12, for details.)

Towage.–There are no tugs stationed at Port Townsend, but they may be obtained from Seattle or other sound ports. Arrangements should be made in advance through ships' agents.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Port Townsend is a **customs port of entry.**

The graystone Custom House-Post Office Building, built in 1893, is conspicuous on the bluff overlooking the waterfront. This building was the customs headquarters for Puget Sound until 1913, when headquarters was moved to Seattle. Deep-draft vessels are inspected alongside the pulpmill wharf; tugs, after leaving their tows, and some small craft go to the Standard Oil pier SE of the Post Office Building for inspection. Most small craft are inspected either at the Point Hudson Boat Harbor or the Port Townsend Boat Haven.

Point Hudson Harbor, just W of Point Hudson, is leased by the Port of Port Townsend to a private company; over 100 small-craft berths, electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. A 15-ton mobile hoist at the harbor can handle craft to 50 feet for hull and engine repairs. In June 1973, reported depths of 15 feet were available through the entrance of the harbor and to the hoist at the NW end of the basin. The town business district is adjacent to the harbor.

Three oil piers are along the waterfront at Port Townsend, 0.1, 0.5, and 0.9 mile WSW of Point Hudson. They are used only for the receipt of petroleum products by barge.

The terminus of the Port Townsend-Keystone ferry is 0.2 mile WSW of Point Hudson Harbor.

The 440-foot-long Union Wharf, 0.1 mile WSW of the ferry slip, has depths of 9 to 22 feet reported alongside and a deck height of 18 feet; receipt of fish, fueling and icing fishing vessels, mooring government vessels; owned and operated by Union Wharf Corp. Numerous shops and a restaurant are on the wharf. Diesel fuel and water are available.

Port Townsend Boat Haven, 1.1 miles SW from Point Hudson, is operated by the Port of Port Townsend. The entrance is marked by lights; in October 1980, the controlling depths were 8½ feet in the entrance channel and 8½ feet in the basin. There is space in the basin for about 500 craft, though there were floats for only about 375 craft in 1973. A seafood packing company, several boat building and boat repair firms, and an electronic equipment repair firm are at the basin. Electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. A 60-ton mobile straddle crane is at the basin for launching and picking up small craft.

A **042°-222° measured nautical mile** has been established off Port Townsend. The range markers, on the Port Townsend Boat Haven breakwater and on the Crown Zellerbach Pier, are orange square daymarks with a black stripe.

Supplies.–Gasoline and diesel fuel are available at Point Hudson Harbor, and gasoline at Port Townsend Boat Haven. Water, ice, and marine supplies are available at these facilities and in the town.

Repairs.–Only minor above-the-waterline repairs can be made to large vessels. A 40-ton mobile straddle crane is available at Port Townsend Boat Haven and a 15-ton hoist at Point Hudson Harbor. Hull, engine, and electronic repairs can be made.

Communications.–A passenger and automobile ferry operates between Port Townsend and Keystone Harbor, just E of Admiralty Head, Whidbey Island. The town is served by a State highway and two railroads.

Glen Cove, about 2.2 miles SW of Point Hudson, is the site of the large Crown Zellerbach papermill, at the N end of the cove. The 480-foot-long pier has reported depths of 30 feet alongside and a deck height of 18 feet. A private light and fog signal, on the seaward end of the pier, are maintained by the mill. A slight current may be encountered, and the use of an anchor is recommended in docking. Fuel oil tankers use the N side of the wharf; paper products are shipped from the S side. The large white building and tall stacks of the mill are prominent, as is the smoke.

A naval restricted area is in the E part of the harbor off **Walan Point** (48°04′18″N., 122°44′47″W.). (See 207.750(p), chapter 2, for limits and regulations.)

Irondale, on the W shore about 1.5 miles from the head of the bay, is the site of a former iron foundry. Shoal water extends nearly 0.3 mile from the shore at this place. Log booms extend N 0.8 mile to **Kala Point,** which is marked by a light.

Hadlock, a village at the head of the harbor, has landings with depths of 10 and 12 feet. A mooring float is maintained here during the summer by the Port of Townsend. Gasoline is available in the town. A marine railway here can handle craft to 20 tons, 42 feet long, and 12 feet wide for hull repairs. Submerged pilings are in the vicinity of the mooring float, and local knowledge is necessary to avoid them.

Port Townsend Canal, a dredged passage giving access to Oak Bay to the SE, is subject to considerable shoaling. In October 1980, the controlling depth was 12 feet. The S entrance is jettied; a light and daybeacon mark the S entrance. A light is at the N entrance.

Currents through the canal are strong at times, although there is no particular danger from them as the channel is wide and straight; there are, however, strong eddies at the S end on the ebb current.

The canal is crossed by a fixed highway bridge with a clearance of 58 feet. Power cables nearby have clearances of 90 feet. (See 162.235, chapter 2, for rules, regulations, and use of the canal.)

Kilisut Harbor, between **Indian Island** on the W and **Marrowstone Island** on the E, is a narrow inlet extending about 4 miles in a SSE direction. A Navy ammunition depot is on Indian Island. The entrance to Kilisut Harbor is 2.5 miles WSW of Marrowstone Point. The entrance channel is winding. In October 1981, a reported depth of 5 feet was in the entrance channel. Inside the harbor is good anchorage in 4 to 5 fathoms. At the S end of the harbor the two islands are connected by an earth-filled causeway and narrow strip of beach. The village of **Nordland** is on the E side of **Mystery Bay,** a small shallow cove midway on the E side of Kilisut Harbor. A small-craft float is maintained in the cove by the Washington State Park System. Water is available. The short pier of an oyster company is just SW of the State Park float. The head of the cove is used as a log dump. Caution should be exercised to avoid two concrete blocks located 20 to 30 feet off the E end of the State Park pier.

Chart 18441.–Admiralty Inlet extends from the Strait of Juan de Fuca to Foulweather Bluff.

Admiralty Head, 80 feet high, on Whidbey Island, is the E entrance point of Admiralty Inlet and the SE extremity of a succession of light bare bluffs which extend N of Point Partridge, where they attain their highest elevation. About 0.5 mile N of Admiralty Head an abandoned lighthouse tower 39 feet high stands on top of a bluff.

Admiralty Bay, E of Admiralty Head, is used only occasionally as an anchorage as it is exposed to SW winds and has a hard bottom and strong currents.

Keystone Harbor (see also chart 18464) is entered through a dredged channel just NE of Admiralty Head. A ferry landing is at the head of the harbor. This landing is the Whidbey Island terminus of the passenger and automobile ferry that operates to Port Townsend. In April 1981, the controlling depth in the entrance channel was 18 feet at midchannel, thence 8 to 13 feet in the harbor basin except for shoaling along the edges. A breakwater, marked by a light, protects the E side of the entrance. A private light on a concrete pile marks the W side of the entrance.

A tall, narrow, grayish green tank is prominent on **Lagoon Point,** 5.5 miles SSE of Admiralty Head.

Bush Point, 8 miles SSE of Admiralty Head, is marked by a light at the end of a low sandspit. Back of the spit the land shows as a low timbered point from N or S. The flood current is reported to set strongly toward Bush Point. Tidal Current Charts for this area should be consulted. Several rocks lie nearly 0.2 mile offshore 1.1 miles SE of Bush Point.

Oak Bay is a cove on the W side of Admiralty Inlet, W of the S ends of Marrowstone and Indian Islands. A ¾-fathom shoal, marked by a buoy, extends S of the E entrance point.

Mutiny Bay, between Bush Point and Double Bluff, affords temporary anchorage near the center in 10 to 20 fathoms. This anchorage is useful if overtaken by fog. The extremities are clay bluffs, and the center is low with extensive flats. Several sport fishing resorts are in the bay. Some have marine railways and can make minor repairs to outboard engines, and most have gasoline, water, and ice. Strong tide rips, at times dangerous for small craft, occur off Double Bluff, particularly on the ebb with strong NW winds. There is frequently an eddy in Mutiny Bay; tidal current charts should be consulted.

Double Bluff, marked by a light, consists of bare, white cliffs, 300 to 400 feet high on its E face, but much lower on its SW face. A lighted buoy marks the extremity of the shoals 600 yards W of the bluff. The shoals are usually marked by kelp.

Chart 18461.–Foulweather Bluff, on the E side of the entrance to Hood Canal, is one of the most prominent cliffs in Puget Sound. The N face, which is bare, is 0.5 mile broad and consists of vertical, grayish sand and clay bluffs, 225 feet high, sloping off on the E side to a bluff 40 feet high, but on the Hood Canal side the point is steep and high. A marsh, enclosed by a sandspit and marked by a light, extends about 500 yards from the base of the bluff on the Hood Canal side. The top of the bluff is fir and underbrush. There are several boulders which bare within 100 yards N of the highest part of the bluff, and a shoal covered 2 to 18 feet extends 200 yards E from the extremity and in line with the face of the bluff. If overtaken by fog, a vessel can find temporary anchorage 0.5 mile N of Foulweather Bluff, in not less than 60 feet. A lighted bell buoy marks the shoal 0.4 mile N of the bluff.

At times the tide rips N of and around Foulweather Bluff are sufficiently heavy to be dangerous to small craft and to break up log rafts. This is most dangerous when the ebb current from the main body of Puget Sound meets that of Hood Canal off the point, and particularly so with the ebb against a strong N or NW wind.

Klas Rock, 0.2 mile from the W shore and 0.7 mile SSE of **Olele Point,** marks the entrance to Mats Mats Bay to the W and to **Port Ludlow** to the S. It is of small extent and awash at high water. The rock, marked by kelp, is surrounded by deep water with depths up to 100 feet between it and the shore. Klas Rock is marked on the N side by a lighted bell buoy, and on the S side by a buoy.

Mats Mats Bay, SW of Klas Rock, is a small, nearly landlocked lagoon offering excellent protection from the wind to small craft. The entrance to the bay is about 100 yards wide at high water. A dredged channel, marked by a **261°15′** lighted range, buoys, and lights, leads from the entrance to the NE corner of the bay. In June 1977, the controlling depth in the entrance channel was 5 feet for a midwidth of 100 feet. Good anchorage may be had in the bay with general depths of 4 to 12 feet. A rock quarry is in the small cove on the E side of the bay; rock and gravel barges are towed from here, and from the barge slip 0.4 miles S of the bay entrance, to Puget Sound ports. A dock, maintained by the Port of Port Townsend, is on the S shore of the bay; transient berthage is available. Alongside the dock is reported to bare at low water. A natural small-craft launching ramp is adjacent to the dock.

The three **Colvos Rocks,** 0.7 mile S of Klas Rock and about 0.3 mile off the W shore, mark the N extremity of the bank covered by 7 to 28 feet which extends in an arc S to **Tala Point.** The NW rock, 28 feet high and of small extent with deep water around it, is marked by a light. The SE point of the shoal extending SE from the rocks is marked by a buoy. Tala Point is a bluff, wooded, and about 310 feet high. A light is about 200 yards NE of the point.

Snake Rock is 0.4 mile SW of the W Colvos Rock and 300 yards offshore.

The entrance to **Port Ludlow,** in the W part of Admiralty Inlet, is just W of Colvos Rocks on the W side at the entrance to Hood Canal. From the broad entrance the bay extends in a general S direction 2.5 miles, terminating in a basin 0.5 mile in diameter. The basin affords good anchorage in 40 to 50 feet, soft bottom; the shores are fairly steep.

The town of **Port Ludlow,** once a major Puget Sound lumber port, is on the N shore of the inner portion of the bay. The former Port Ludlow townsite is now occupied by a housing development and resort of the same name. All that remains of the once thriving lumber industry here are the ruins of the municipal wharf, the concrete foundation of a sawmill slash burner, and a log dumping ground at the head of the bay. A few private small-craft floats are in the bay.

The resort has berths for nearly 100 craft; electricity, gasoline, diesel fuel, water, and ice are available. Reported depths of 16 feet can be taken to the floats. Lodging is available.

The Twins are two islands at the extreme SW portion of Port Ludlow. The small bay S of The Twins is sometimes used as an anchorage for small craft in rough weather.

Hansville, about 2.5 miles ESE of Foulweather Bluff, is a small village with stores and several waterfront resorts. Berthage is not available; however, two of the resorts have marine railways and 2-ton hoists that can handle craft up to 19 feet. Gasoline, water, and ice are available. During the fishing season, many purse seiners operate just off the beach in the Hansville area.

Norwegian Point, low and rounding, is about 0.2 mile NW of Hansville. A conspicuous privately owned lighthouse, 210 feet above the water and built from plans of the original lighthouse at Mukilteo, is about 1 mile W of Hansville.

Point No Point, on the W shore of the sound about 3.5 miles SE of Foulweather Bluff, is a low sandspit. **Point No Point Light** (47°54.7'N., 122°31.5'W.), 27 feet above the water, is shown from a 20-foot white octagonal tower on the end of the point; a fog signal is at the station.

Chart 18441.–Useless Bay, indenting Whidbey Island E of Double Bluff, is open to the SW. The shores are bluff, brush covered, and low with a marshy area surrounding the bay. The N and SE sides of the bay are spotted with homes. At night, the lighted antenna about 2 miles NE of the head of Useless Bay is prominent.

Scatchet Head and Possession Point, at the S end of Whidbey Island, are both prominent, especially from S; the white bluffs are visible for a considerable distance. A lighted bell buoy is 0.5 mile S of Possession Point. Shoals extend 0.5 mile offshore immediately W of Scatchet Head and over 0.2 mile offshore from the head to Possession Point. A lighted gong buoy is about 0.5 mile off Scatchet Head. **Cultus Bay,** just W of Possession Point, is shoal; much of the bay bares at low water. A private mooring basin is on the E side of the bay. A channel, marked by private buoys and daymarks, leads to the basin.

Possession Sound and its tributaries are described later in this chapter.

Chart 18446.–Apple Cove Point is a low sandspit projecting 220 yards from the high, wooded land of the peninsula. The point is steep-to, but a shoal makes out nearly 0.5 mile SE from it. Just off the point is a light. Heavy tide rips caused by strong NW winds and a strong ebb current are encountered in the vicinity of the light.

A microwave tower on the high ground about 0.6 mile SW from Apple Cove Point Light, is prominent from offshore.

Appletree Cove is the open bight on the W side of the sound about 1.5 miles S of Apple Cove Point. It affords anchorage in 30 to 60 feet inside the line of the entrance points, with some shelter from winds drawing in or out of the sound, but not from N and SE. Shoaling to 18 feet exists about 0.2 mile S to SE of the end of Kingston breakwater.

Kingston, a town on the N side of the cove, has a large, well-equipped small-craft basin and a pier with a ferry slip at its end. The ferry runs between Kingston and Edmonds. The basin is used by tugs, fishing boats, and pleasure craft. The harbor is protected by a stone breakwater that extends about 340 yards SW from the ferry pier; the end of the breakwater is marked by a light. The entrance and the W side of the harbor are marked by daybeacons. In 1976, the controlling depth was 12 feet through the entrance and in the E part of the basin with 9 feet in the W part of the basin. Berths for 275 craft, electricity, gasoline, diesel fuel, water, ice, dry storage, and marine supplies are available. A tidal grid that can handle craft up to 65 feet, and a 4-ton hoist are also available. Hull and engine repairs can be made.

Edwards Point is a high, wooded point on the E side of Puget Sound 3.6 miles ESE of Apple Cove Point. It is a turning point for vessels running from Seattle N into Possession Sound and adjoining waters. An oil storage and distributing plant of the Union Oil Company of California is on the point. Many large tanks on and below the bluff make the point prominent from seaward. The plant's 276-foot wharf has reported depths of 35 feet alongside. However, a depth of 31 feet has been reported 60 feet N of the S end of the wharf. Due to the short wharf, unpredictable current, and prevalence of S winds, the use of a tug in docking is recommended. An anchor may be used in the approach, but it will not fetch up until the ship is close to the wharf. Dock lights, a lighted sign, and a fog signal are maintained by the company. Fuel barges are loaded here, and ships may be bunkered, but there are no provisions for the replenishment of stores.

Edmonds is an incorporated city 1 mile NE of Edwards Point with a small boat basin and marina under the administration of the **Port of Edmonds.** The basin, protected on its N, W, and S sides by a breakwater, is entered from the W at about midpoint of the W section of the breakwater. The breakwater is marked by lights, a daybeacon, and a buoy. In July 1981, the midchannel controlling depth was 13 feet through the entrance; thence depths of 8 to 12 feet were inside the basin with lesser depths at the sides. Open and covered berths for about 700 craft to 50 feet, including 50 transient berths, are available. Berth assignments are made by the **harbormaster.** Electricity, gasoline, diesel fuel, water, ice, marine supplies, and a 35-foot marine railway and 4-ton hoist are available in the basin. A private boatyard is also available for minor hull and engine repairs.

The ferry landing for the Edmonds and Kingston ferry is just northward of the boat basin.

Point Wells is a low, sandy point projecting 450 yards from the high land 1.5 miles S of Edwards Point on the E side of the sound. It is distinguished by prominent oil tanks. It is a water terminal and storage plant of Chevron USA, Inc. There are two wharves here, however, only the S wharf is in use. The wharf is 1,054 feet long and has a deck height of 21 feet. In June 1972, depths of 38 feet were alongside. A conveyor serving this wharf is used for outloading drummed petroleum products. Barges are loaded on the inside of both the N and S extensions of the wharf.

The current at Point Wells is unpredictable being inconsistent for similar tidal conditions; however, a vessel making a port landing on a flood tide may expect to be set off the pier. The use of an anchor is recommended when docking in high wind. The Manager of the Marine Department of Chevron USA, Inc. prefers that vessels not be docked without the use of tugs when conditions are such that damage might be done to the wharf. Deep-draft vessels approaching the wharf for a starboard landing during a flood tide must guard against being set on to the shoal S of the wharf. The lighted range on the point is used to clear the shoals N of the N wharf. A company-maintained fog signal is on the S wharf.

Richmond Beach is a community on the E shore just S of Point Wells. A tall, charted radio tower (KGDN), marked by aircraft warning lights, is about 1.5 miles inshore from Richmond Beach; it is an excellent landmark, especially at night.

Charts 18446, 18449.–Bainbridge Island, 9 miles long and heavily wooded, forms part of the W shore of Puget Sound. There are several towns on the island.

Port Madison indents the W shore between the N end of Bainbridge Island and **Point Jefferson.** It is about 2.5 miles long and deep; not until within 0.5 mile of the beach can anchorage be found in 90 or 100 feet, sticky bottom. Its SW part connects with Port Orchard through Agate Passage.

The N shore is formed by broken white bluffs, with low beaches between, and bordered by sand and shingle beaches that bare in some cases as much as 0.2 mile off. The bluffs on the W shore are moderately low; the buildings of the Indian reservation near the entrance to Agate Passage are prominent. **Indianola,** a village on the N shore, has a long pier with a light on its end. The water E of the end of this pier is shoal.

Miller Bay, in the NW part of Port Madison, is used by shallow-draft pleasure craft. The channel, privately marked, should not be used at low tide because of the very irregular bottom. Anchorage in 6 to 7 feet, sticky mud bottom, may be had N of the second buoy. The controlling depth to this anchorage is about 1 foot.

Squamish, is a small town N of Agate Passage.

Point Monroe, the S point at the entrance of Port Madison, is a low, narrow sandspit, curving W and S and marked by a light. A small cove is between the sandspit and the shore to the S. The entrance dries at low water.

The S shore of Port Madison is composed of broken bluffs, except where it is indented by the narrow arm extending 1 mile S. The entrance to this narrow arm is 0.7 mile W of Point Monroe Light. The town of **Port Madison,** once the county seat, is a summer resort with many cottages and private piers along its shores. The moorings here are private, and there are no fueling facilities. The narrow channel through the arm has a least depth of about 14 feet, and local knowledge is necessary to keep in the best water. A submerged rock, covered 6 feet and marked by a daybeacon, is in (47°41'51"N., 122°32'07"W.), about 220 yards SSW of **Treasure Island;** caution should be exercised. An old ballast dump, nearly bare at low water, is 75 yards offshore 400 yards in from the E entrance point. Care should be taken to avoid the cluster of covered rocks 100 yards off the E entrance point. Sheltered anchorage for small craft may be had in up to 21 feet, mud bottom.

Meadow Point, on the E side of Puget Sound nearly opposite Point Monroe, is a low, grassy point, with a high tree and brush-covered bluff behind it. A lighted buoy is 440 yards NW of the point.

Murden Cove is an open bight on the W side of the sound about 3.5 miles S of Point Monroe. An extensive flat which bares extends almost 0.5 mile from the head of the cove, and outside of it the depth increases rapidly. **Skiff Point,** the N entrance point, has low yellow bluffs to the S. A shoal extends about 250 yards from the point; this shoal is reported to be building out and should be given a wide berth. **Yeomalt Point,** the S entrance point, is a low, grassy sandspit, 150 yards wide, rising gradually to the general level of the high land. The radio towers about 0.9 mile SW of Skiff Point are prominent from offshore.

Wing Point, on the N side of the entrance to Eagle Harbor, is a narrow, bluff point 30 feet high, covered with trees to the edge. A reef extends SSE for 0.5 mile from Wing Point and is generally marked by kelp. The S extremity of the reef is marked by a buoy. **Tyee Shoal,** 0.7 mile SSE of Wing Point, with a least depth of 15 feet, is marked by a light with a fog signal.

Foul ground extends as much as 500 yards off the S point at the entrance; a light and buoy mark its outer limits.

Eagle Harbor indents the E shore of Bainbridge Island opposite Elliott Bay. It is 2 miles long and affords excellent anchorage in 30 to 39 feet, muddy bottom. It narrows at the head to 300 yards.

The entrance is deep, but caution is necessary in entering because the natural channel is only 200 yards wide between the reef S of Wing Point and the spit on the W side of the channel entrance. The channel is marked by lights and buoys.

Winslow is the largest town on Bainbridge Island. It is on the N shore of Eagle Harbor, and is a major ferry port on the routes out of Seattle to the W. About 0.2 mile W of the ferry slip is a large building and two piers which were once part of a shipyard. The facilities are now used by the Washington State Ferry System for ferry mooring and maintenance. A small marina and machine shop are just W of the W pier. Berths, water, and limited engine repairs are available. Another marina, farther westward, has berths, gasoline, diesel fuel, electricity, water, ice, marine supplies, and pump-out facilities.

Creosote, a residential area with a creosoting plant, is on the S side of the entrance to Eagle Harbor. The plant has a large wharf; a charted stack at the plant is prominent. Ships formerly loaded creosoted lumber alongside the wharf here, but the lumber is now barged to Seattle for reshipment. A light and fog signal are 0.2 mile ESE of the creosote plant stack. **Eagledale,** a small town on the S shore about 0.5 mile W of Creosote, has a small marina. There are about 65 berths here. Electricity, water, and ice are available.

Blakely Rock, the highest of four rocks, is prominent in approaching Blakely Harbor; it is 0.7 mile N of Restoration Point and at high water shows about 15 feet at its highest point. It is 300 yards long, with shoal water, well marked by kelp, extending over 250 yards N. A light is on the S side of the rock.

Blakely Harbor is a small inlet on the E shore of Bainbridge Island near its S end. It is 1 mile long. Depths range from 145 feet at the entrance to 25 feet near the head. The usual anchorage is near the entrance in 54 to 96 feet, sticky bottom, slightly favoring the S shore. There are many old pilings and dolphins in the shoal waters near the shores. There are no usable wharves in Blakely Harbor. One of the world's largest sawmills once operated here.

Restoration Point is flat and about 10 feet high for 300 yards from the shore, then it rises abruptly to a wooded knoll about 100 feet high, on which a number of large buildings are prominent. **Decatur Reef,** partly bare, extends 300 yards E of Restoration Point. The outer end of the reef is marked by a light.

Charts 18449, 18446, 18447.–Shilshole Bay is between Meadow Point and West Point. It is an open bight from which the Lake Washington Ship Canal is entered, and is the site of the largest and most important single marina in the Seattle area. S of the canal entrance, clay cliffs extend for about 0.5 mile.

Shilshole Bay Marina, the small-craft basin just N of the canal entrance, is administered by the Port of Seattle. A long breakwater, marked at each end by a light, protects the basin on its W side. The basin has two entrances. In March 1974, the controlling depths were 14 feet in the N entrance and 15 feet in the S entrance; depths alongside the floats in the basin were about 15 feet in the S half, and about 10 feet in the N half.

There are berths at the concrete floats for 1,500 craft of up to 130 feet long, including a guest pier and transient berths. Electricity, gasoline, diesel fuel, water, ice, marine supplies, and a pumpout station are available at the 600-foot pier at the midpoint of the basin. Propane is available at the S end of the basin. All berths have electricity and water. A 25-ton mobile hoist and a tidal grid are in the basin. A launching ramp is at the N end of the basin. A Coast Guard vessel is moored at the 600-foot pier.

Storm warning signals are displayed. (See chart.)

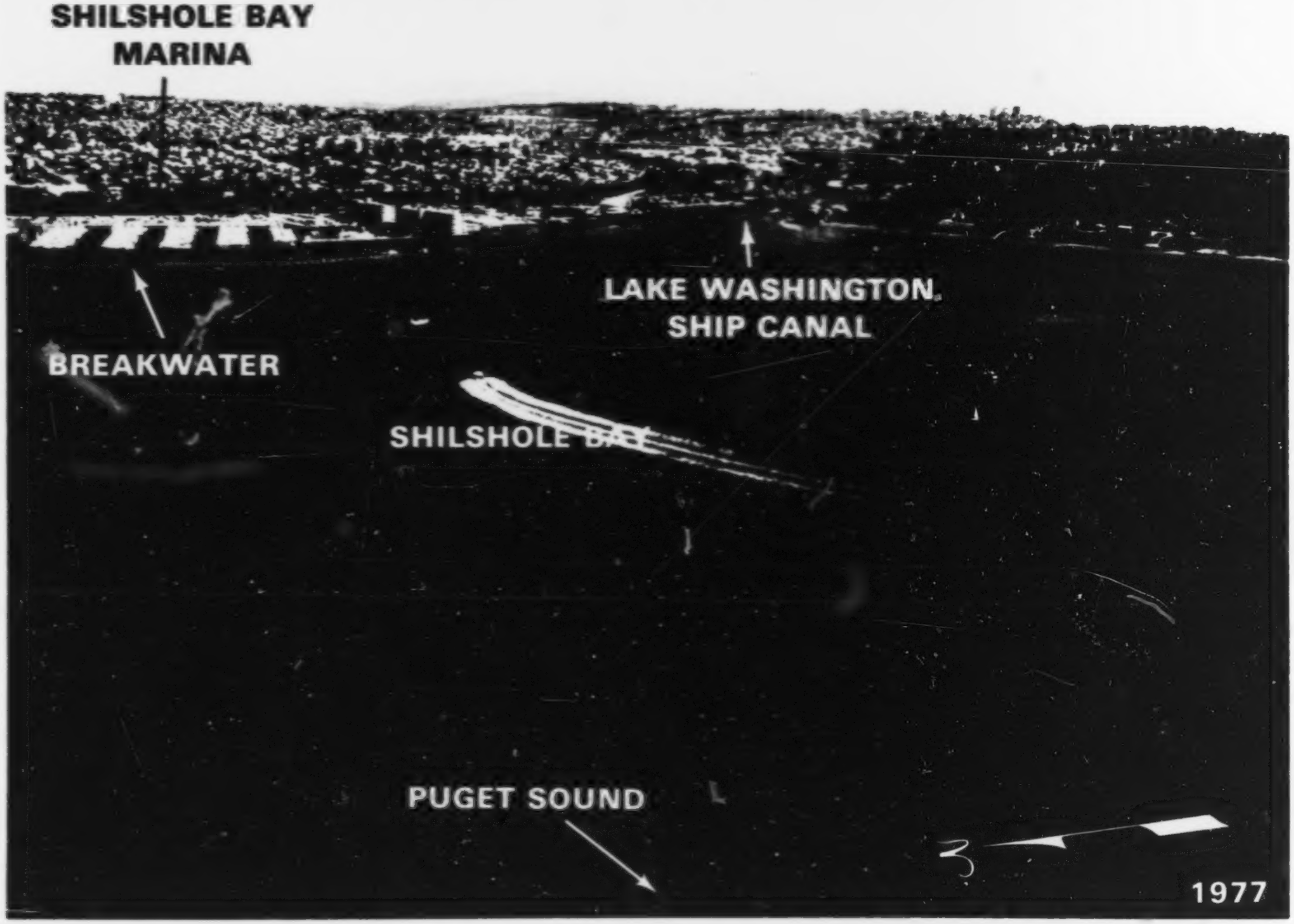
West Point, at the N entrance to Elliott Bay, is a low, sandy point which rises abruptly to an elevation of over 300 feet 0.5 mile from its tip. The edge of the shoal extending WSW from the point is marked by a lighted buoy. **West Point Light** (47°39.7'N., 122°26.1'W.), 27 feet above the water, is shown from a 23-foot white octagonal tower attached to a building on the end of the point; a fog signal is at the station. Prominent in the area are the sump tanks of a sewage treatment plant about 0.1 mile E of the light, a VTS antenna tower between the plant and the light, and a large white dome about 1 mile ESE of the light.

Alki Point, at the S entrance to Elliott Bay, is low with a small prominent wooded knoll about 80 feet high immediately back of it. E of the knoll, lowland extends for nearly 0.4 mile before rising to the high land extending S from Duwamish Head. **Alki Point Light** (47°34.6'N., 122°25.2'W.), 39 feet above the water, is shown from a 37-foot white octagonal tower attached to a building on the end of the point. A fog signal and a special radio direction finder calibration station are at the light. (See Light List for operational information.)

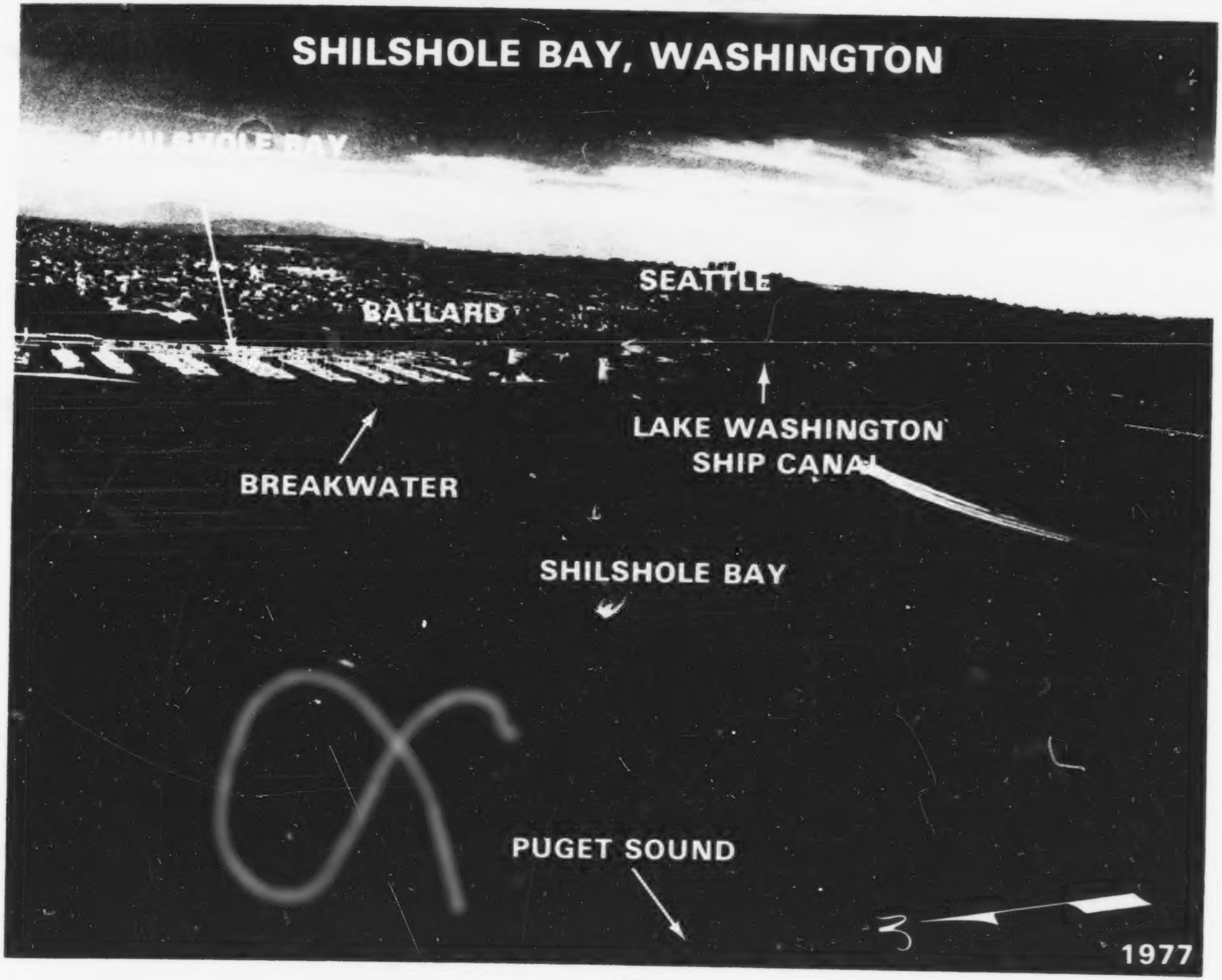
Elliott Bay indents the E shore of Puget Sound just N of Duwamish Head. The entrance is between West Point on the N and Alki Point 5 miles S. The bay proper, lying E of a line between Magnolia Bluff and Duwamish Head, has a width of about 2 miles and extends SE for nearly the same distance. The bay has deep depths throughout most of its area.

Magnolia Bluff, largely bare, light-colored, and rising in places to nearly 300 feet, extends along

SHILSHOLE BAY, WASHINGTON


SHILSHOLE BAY
MARINA
BREAKWATER
LAKE WASHINGTON
SHIP CANAL
SHILSHOLE BAY
PUGET SOUND
1977

329



SHILSHOLE BAY, WASHINGTON

SEATTLE
BALLARD
LAKE WASHINGTON SHIP CANAL
BREAKWATER
SHILSHOLE BAY
PUGET SOUND

1977

the N shore from West Point to Smith Cove. **Fourmile Rock** is 60 yards offshore, 1.7 miles SSE of West Point Light. A light is on the rock.

Duwamish Head, 1.8 miles NE of Alki Point and rising to over 260 feet from the point, bounds Elliott Bay to the S. The bluff is tree covered, but is interspersed with houses. The lights of the houses along the beach and on the bluff are conspicuous at night. A shoal, extending over 0.2 mile N of the point, is marked by a light and fog signal.

Chart 18450.–Seattle, the largest and most important city in the Northwest and one of the major ports of the Pacific Coast, extends as a greater metropolitan area from Everett, the city on its N, almost to Tacoma, the major city to the S. This area is thickly populated, not only in that N-S dimension but also E beyond the limits of Lake Washington and its shores. Seattle has seven fully equipped ocean terminals, excellent transportation facilities, several large shipyards, and numerous large marine supply houses.

Much of Seattle's shipping is in the oriental trade, and the city itself has grown into a major industrial center. Seattle handles most of the waterborne commerce to Alaska points, and is the terminus of several shipping lines operating to Alaska as well as other parts of the world. Almost 22 per cent of Seattle's commerce is in the foreign trade, with British Columbia, Japan, Asia, and Europe forming the cornerstone of the overseas commerce. Principal exports are grain and grain mill products, logs, petroleum products, food and vegetable products, lumber, waste and scrap, chemicals, cement, wood chips and fuel wood, fabricated metal products, and sulfur. The principal imports are logs, lumber, sand and gravel, iron and steel, petroleum products, newsprint, bananas, cement, canned fish and shellfish, limestone, machinery, pulp and paper, asphalt and tar, radio and TV products, and clay.

The **Port of Seattle** includes an outer and inner harbor. The outer saltwater harbor includes Elliott Bay; East, West, and Duwamish Waterways; Shilshole Bay, and the portions of Puget Sound adjacent to Ballard on the N and West Seattle to the S of the entrance of Elliott Bay. Seattle's freshwater inner harbor consists of Lakes Union and Washington, which are connected with each other and with Puget Sound by the Lake Washington Ship Canal. Most of the waterfront facilities of the inner harbor are privately owned.

Of the nearly 60 piers and terminals in the outer harbor, the Port of Seattle owns 25, operating 3 and leasing out the others. These properties include 10 general cargo handling facilities and 1 major container handling terminal. The port also has four fully developed marine terminals, and a fifth in the construction phase, on the Duwamish Waterway S of Harbor Island in the Lower Duwamish Development District, a project which provides leasesites for terminal facilities and water-oriented industries. The Port of Seattle also operates Seattle-Tacoma International Airport, which is located about midway between Seattle and Tacoma.

Although there are several important terminals on Elliott Bay, many of the piers are used by fisheries, ferry and tourboat terminals, and for entertainment facilities. Piers 90 and 91, at the former Naval Supply Depot on the N side of the bay in Smith Cove, are now operated by the Port of Seattle under an interim license agreement with the U.S. Navy. The piers are used for commercial operations, but military cargo gets preferential handling. The office of the Coast Guard Captain of the Port is on Pier 90.

East Waterway is separated from West Waterway by **Harbor Island.** Several important terminals are on the waterway. Most of the N side of Harbor Island is occupied by the piers and drydocks of a shipyard. A private light, shown from the NE corner of Terminal 18, marks the W side of the entrance to East Waterway.

Most of the E side of **West Waterway** and the area W of the entrance are occupied by the facilities of two large shipyards. The SW side of the waterway is the site of the Port of Seattle's Terminal 5, which receives considerable deep-draft traffic. Several other wharves on the waterway also receive deep-draft vessels. (See 162.235(b), chapter 2, for traffic control regulations for the waterway.)

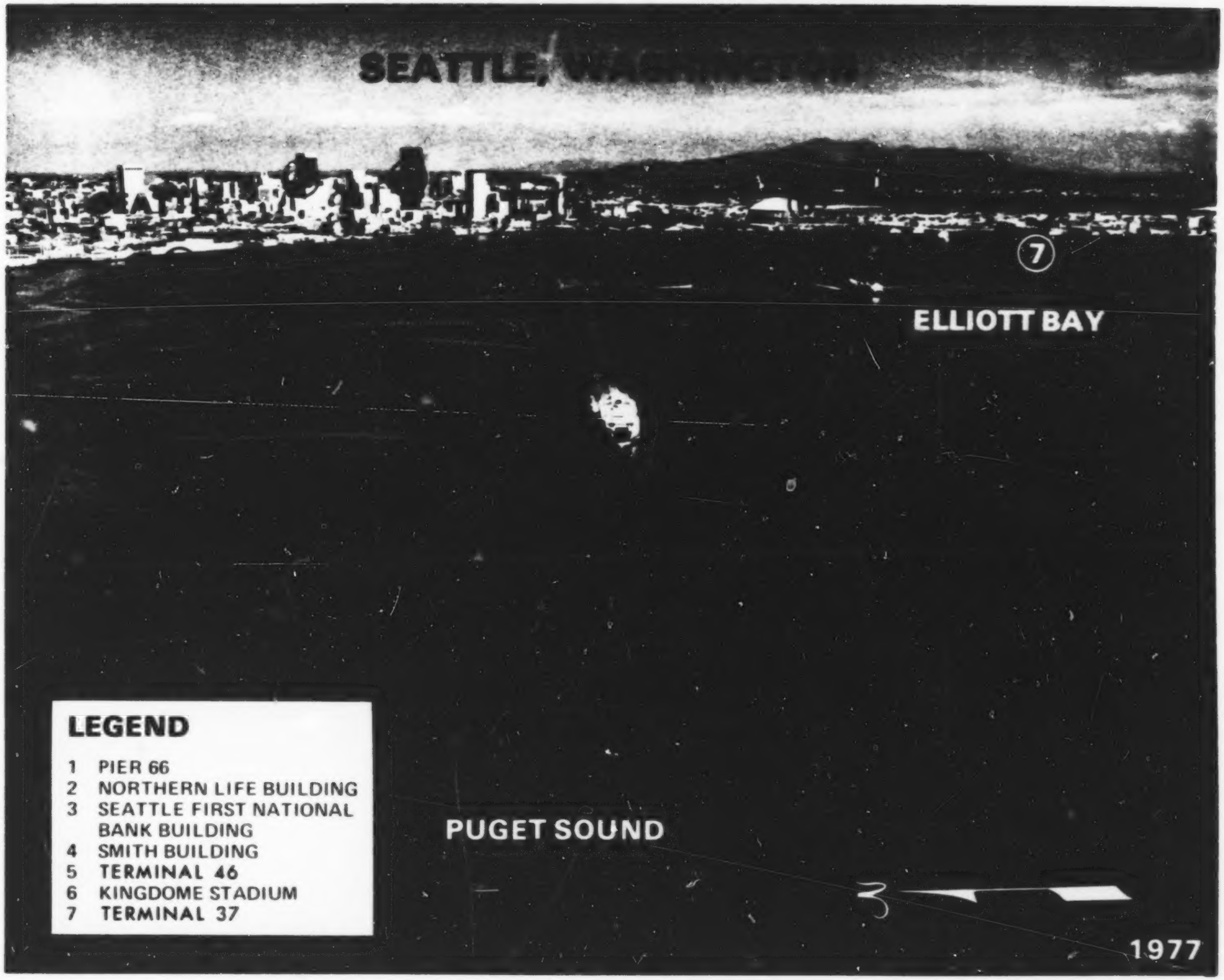
Duwamish Waterway, extending S from West Waterway, is fronted by factories and industrial plants for more than 4 miles. A number of log rafts are often anchored along the waterway around Kellogg Island and S of the 1st Avenue South Bridge.

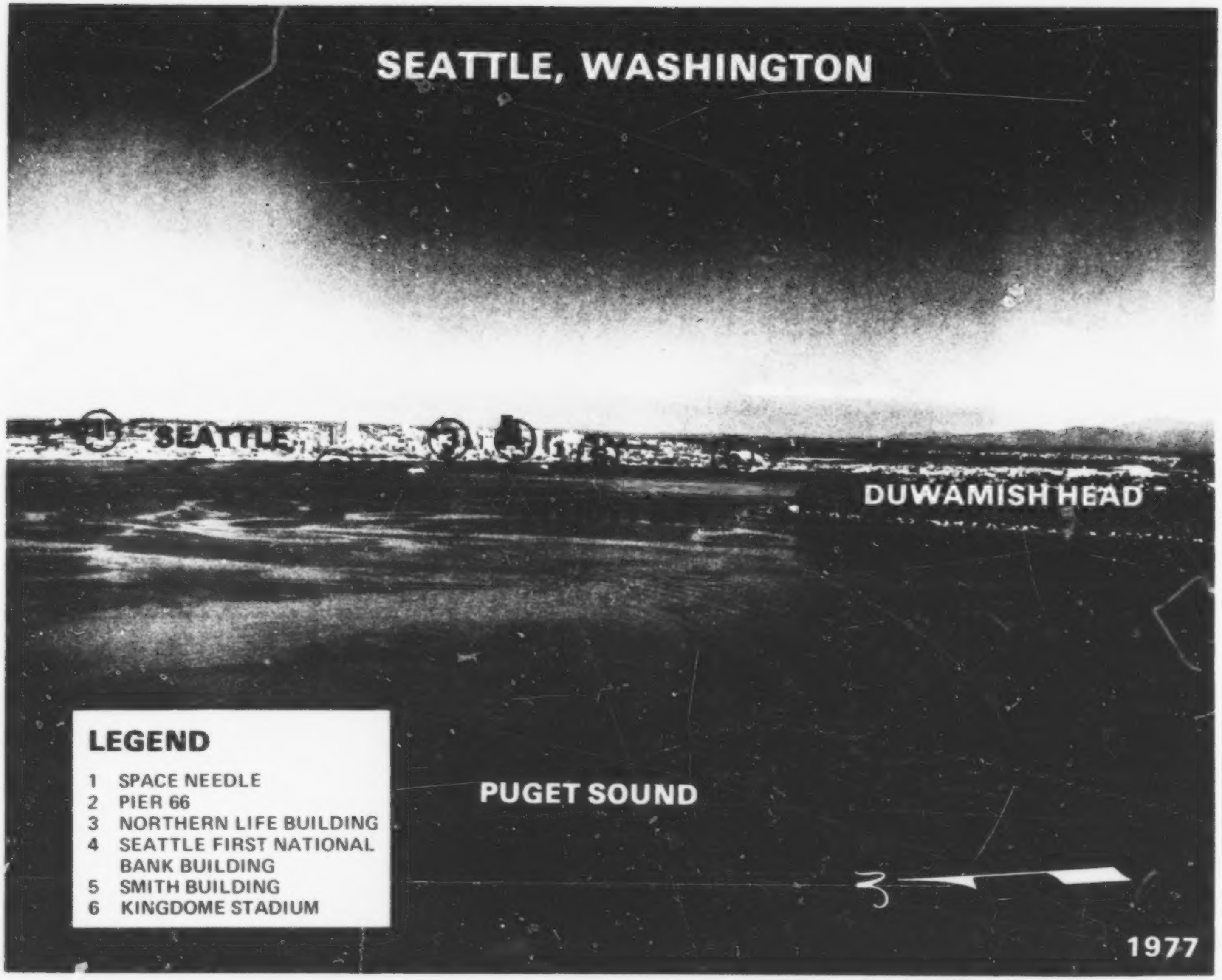
Prominent features.–In clear weather the skyline of Seattle itself is unmistakable. From N to S the conspicuous features are: the "Space Needle", a legacy from the 1962 World Fair; the red lighted "E" sign at pier 67; the Washington Building, of light sandstone, usually illuminated at night; the Northern Life Tower; the square-topped Seattle First National Bank building, distinguished from two other skyscrapers by its slightly taller height and black color; the tower of the Smith Building and the 250-foot-high King County Domed Stadium (Kingdome). From several miles off, the Space Needle and the Seattle First National Bank building are easily the most identifiable objects.

Channels.–Depths of 34 feet or more are available to the Seattle waterfront in Elliott Bay. A Federal project provides for a depth of 34 feet in East and West Waterways. The project for Duwamish Waterway provides for a 30-foot channel from the S end of West Waterway to the 1st Avenue South Bridge, thence 20 feet for about 0.65 mile to 8th Avenue South, thence 15 feet to a point about 1.2 miles S of the 14th Avenue South Bridge, the end of the project. (See Notice to Mariners and latest editions of charts for controlling depths.)

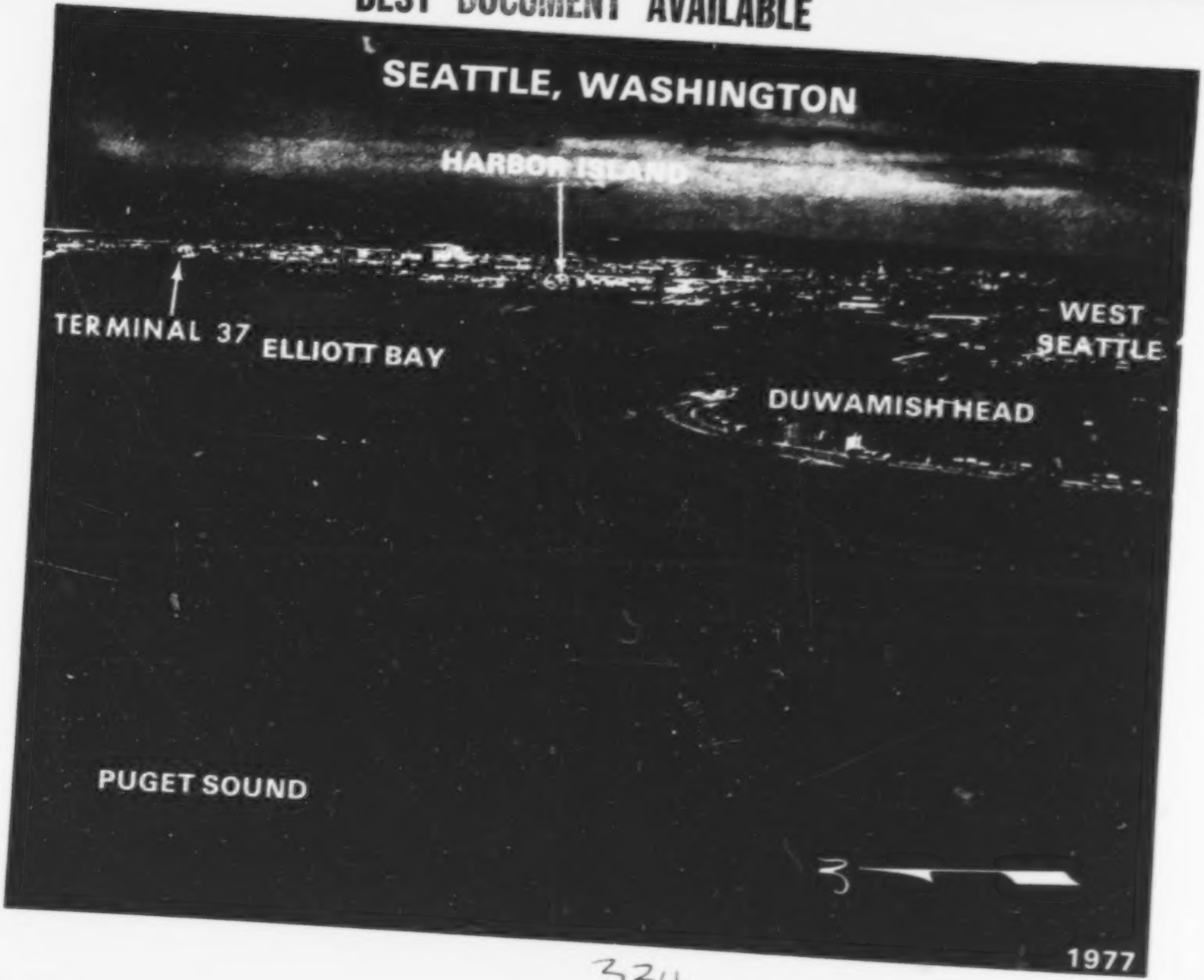
Anchorages.–Four general anchorages are in Elliott Bay. (See 110.1 and 110.230, chapter 2, for limits and regulations.)

Bridges.–There are no bridges over the Seattle waterfront in Elliott Bay, and none over East and West Waterways. The 4.5-mile-long Duwamish Waterway is crossed by four bascule bridges with


SEATTLE, WASHINGTON
7
ELLIOTT BAY
LEGEND
1 PIER 66
2 NORTHERN LIFE BUILDING
3 SEATTLE FIRST NATIONAL BANK BUILDING
4 SMITH BUILDING
5 TERMINAL 46
6 KINGDOME STADIUM
7 TERMINAL 37
PUGET SOUND
1977

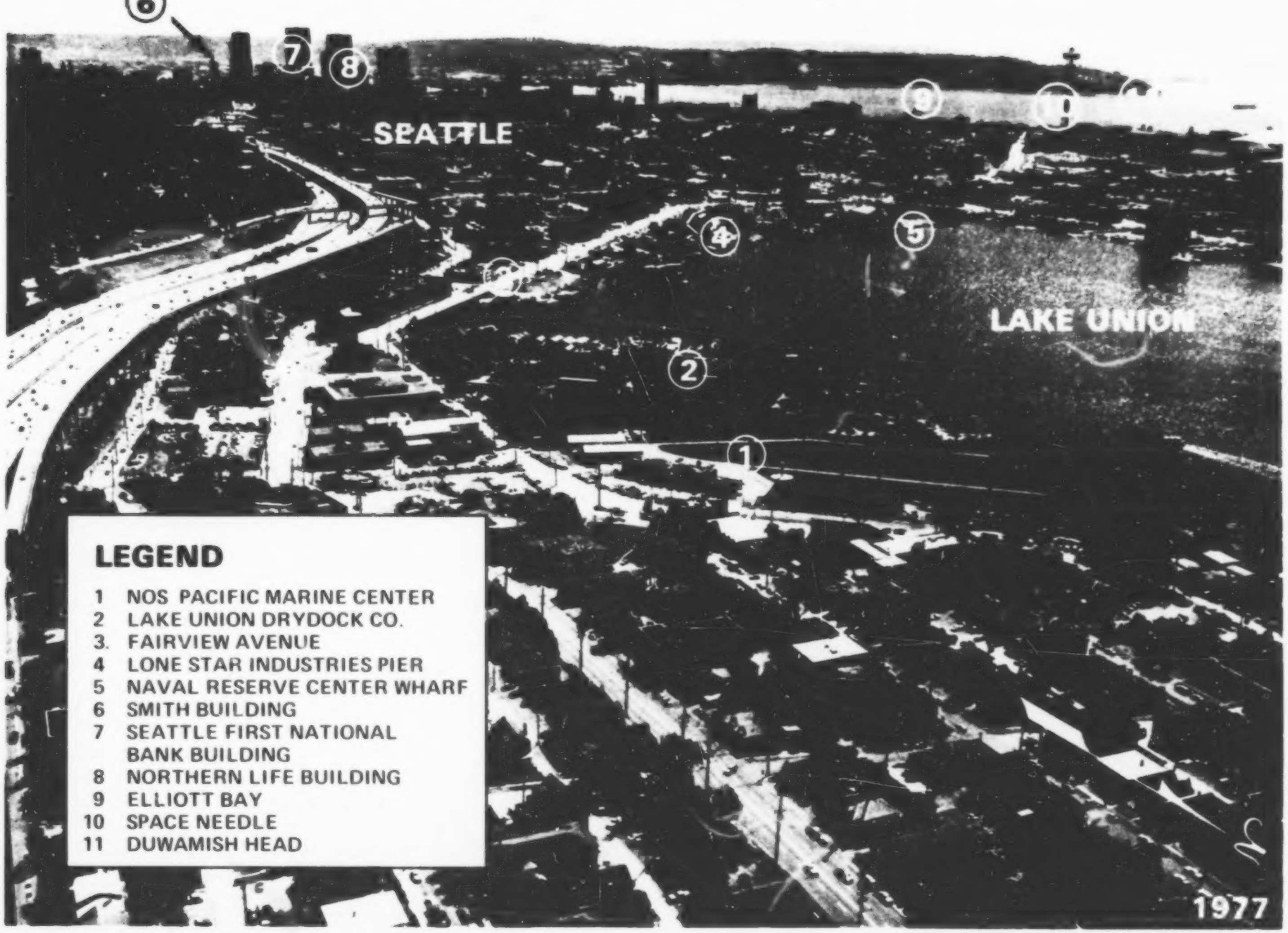

SEATTLE, WASHINGTON
1
SEATTLE
3
4
DUWAMISH HEAD
PUGET SOUND
LEGEND
1 SPACE NEEDLE
2 PIER 66
3 NORTHERN LIFE BUILDING
4 SEATTLE FIRST NATIONAL BANK BUILDING
5 SMITH BUILDING
6 KINGDOME STADIUM
3
1977

BEST DOCUMENT AVAILABLE


SEATTLE, WASHINGTON
HARBOR ISLAND
TERMINAL 37
ELLIOTT BAY
WEST SEATTLE
DUWAMISH HEAD
PUGET SOUND
1977

334

SEATTLE WASHINGTON


6
7
8
SEATTLE
9
10
11
4
5
3
2
LAKE UNION
1
1977

LEGEND

1	NOS PACIFIC MARINE CENTER
2	LAKE UNION DRYDOCK CO.
3.	FAIRVIEW AVENUE
4	LONE STAR INDUSTRIES PIER
5	NAVAL RESERVE CENTER WHARF
6	SMITH BUILDING
7	SEATTLE FIRST NATIONAL BANK BUILDING
8	NORTHERN LIFE BUILDING
9	ELLIOTT BAY
10	SPACE NEEDLE
11	DUWAMISH HEAD

clearances of 7 to 24 feet. (See 117.790, chapter 2, for drawbridge regulations and opening signals.) The power cables in this section have a least clearance of 90 feet.

Tides and currents.–Tides at Seattle have a mean range of 7.6 feet and a diurnal range of 11.3 feet. A range of about 18 feet may occur at the time of maximum tides. (See Tide Tables for daily predictions.) As a rule, the tidal **currents** in the harbor have little velocity. At times, however, with a falling tide an appreciable current will be found setting NW along the waterfront. (See Tidal Current Charts for Puget Sound, Northern Part.)

Weather.–Seattle is on a hilly stretch of land overlooking the saltwaters of Puget Sound to the W, and in an E direction, the waters of Lake Washington, a 22-mile-long freshwater lake. The Lake Washington shoreline roughly parallels that of Puget Sound at distances varying from about 2.5 to 6 miles. Hills rise rather abruptly from both shorelines and reach elevations of more than 300 feet in the central sections and more than 500 feet in the extreme N and the SW sections. The general N-S trend of the city is paralleled on the E by the Cascade Mountains, while to the W and NW, at somewhat greater distance, the Olympic Mountains rise abruptly. The main commercial section of the city is along the E shore of Elliott Bay, an indentation in the Puget Sound shoreline.

The climate is mild and moderately moist due to the prevailing W air currents, which advance inland from the Pacific Ocean, and to the shielding effects of the Cascade Mountains, which serve to exclude and deflect the cold continental air toward the E. Although the city is 90 miles distant from the ocean at the nearest point, the marine air penetrates readily inland, an effect that is aided by the extensive water surface of Puget Sound. The prevailing W air currents cross vast reaches of ocean, acquiring much water vapor and a temperature near that of the sea. This effect is received from the general currents of the ocean rather than from the Japanese Current which curves far N into Alaskan waters. As a result of the rather steady influx of marine air, winters are comparatively warm and summers cool. Extremes of heat or cold are moderate and usually of short duration, and the daily range in temperature small.

The warmest summer and the coldest winter days come with N to E winds which have traveled under land influences from British Columbia or eastern Washington. In the summer, the number of days having maximum temperatures of 90°F or above averages less than 3, and only twice during the entire period of record has the temperature reached 100°F. Nighttime temperatures during the warmest months usually reach comfortable levels, and very seldom remain about 65°F. During the winter, daily maximum temperatures fail to rise above the freezing point on an average of only about 2 days per year, while the number of days having minimum temperatures of 32°F or below averages only 15 per year. An extreme low temperature of 3°F was recorded in January 1893, with 10°F the lowest recorded since that time. However, this circumstance may be attributed in part to the effects of urbanization. In general, temperatures may vary by several degrees at any one time throughout the city, depending on wind direction, distance from shoreline, and elevation.

The normal precipitation of less than 34 inches is moderate compared with many points along the N Pacific Coast. Primarily this is due to the location of the city, which lies in the lee or dry side of the Olympic Mountains. The W or windward slopes of these mountains cause the moist marine winds to rise to cooler levels with heavy precipitation on the seaward slopes and diminished amounts E of the summits. A winter seasonal wet period along the Pacific Coast coincides with and is caused by the Aleutian Low. In summer this low pressure recedes N with higher pressures off the coast and results eventually in clear weather, rising temperatures, and decreased humidities. The area has, therefore, a pronounced but not sharply defined wet season extending usually from October through April, a period in which about 82 percent of the total precipitation occurs, and a dry season, May through September, with 18 percent. Excessive precipitation is rare, but in the wet season the continuance of light or moderate amounts is rather persistent. The average winter snowfall totals about 9 inches, and snow seldom remains on the ground for more than 1 or 2 days at a time. Maximum recorded snow depths have ranged from as little as a trace in several instances to over 21 inches. The occurence of light fog is most frequent during late fall and winter. Thunderstorms average about six per year, lightning damage is very infrequent, and tornadoes have never been reported in the city.

The National Weather Service maintains an office in Seattle. **Barometers** may be compared there or by telephone. (See appendix for address.)

(See page T-8 for **Seattle climatological table.**)

Routes.–Vessels bound for the Strait of Georgia from Seattle can use the following routes: **via Rosario Strait**–an approximate midchannel course using the vessel traffic system outbound lane (see the beginning of chapter 12 for Traffic Separation Scheme information), through Puget Sound and Admiralty Inlet to the precautionary area N of Point Wilson, thence E of Partridge Bank, Smith Island, and Davidson Rock to the precautionary area at the S end of Rosario Strait, thence N passing E of Belle Rock, Lydia Shoal, and Peapod Rocks, thence leaving the vessel traffic system lanes at the precautionary area just N of Clark Island, and proceeding into the Strait of Georgia either N or S of Alden Bank; **via Haro Strait**–from Admiralty Inlet using the vessel traffic system outbound lane to the precautionary area N of Point Wilson, thence W of Partridge Bank and Hein Bank leaving the vessel traffic system lanes at the precautionary area just SE of Hein Bank, thence through Haro Strait and Boundary Pass to the Strait of Georgia.

These routes are available for vessels of any draft. A range should be steered where available to ensure making the courses good.

Between Admiralty Inlet and the entrance to Rosario Strait, the current on the flood has a tendency to set a vessel E toward Whidbey Island; it also sets strongly through Deception Pass and up Rosario Strait. There is a strong W set in this area on the ebb tide. Through Rosario Strait the currents run with considerable velocity. Heavy tide rips and swirls are found off Black Rock, Obstruction Pass, Peapod Rocks, and Lawrence Point.

In crossing from Admiralty Inlet to the entrance of Haro Strait, the tidal currents setting to and from Rosario Strait and San Juan Channel, with estimated velocities of 2 to 3 knots, should be kept in mind. From Henry Island to around Turn Point, heavy tide rips are found on the ebb. Particularly heavy and dangerous tide rips occur on the ebb between East Point and Patos Island and for 2 miles N in the Strait of Georgia. The flood from Rosario Strait, which is felt as soon as the passage between Orcas and Sucia Islands is open, is apt to set a vessel toward East Point. The ebb in this vicinity sets to the E even before the Strait of Georgia is well open.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Puget Sound from the Puget Sound Pilots or the Washington Pilots Association. (See **Pilotage,** chapter 12, for details.)

Towage.–Tugs up to 5,000 hp are available in Seattle. Arrangements should be made in advance through ship's agent.

Seattle is a **customs port of entry.**

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) The quarantine anchorage is just N of Harbor Island.

Coast Guard.–The **Captain of the Port** maintains an office at Pier 90 in Smith Cove. **Marine inspection** and **vessel documentation offices** are at Pier 36. (See appendix for addresses.)

Harbor regulations are enforced by the Harbor Patrol Unit of the Seattle Police Department. The unit has two patrol boats to aid in the enforcement of the city ordinance prohibiting unlawful destruction by excessive speeds, disorderly behavior, or unsafe seamanship. They maintain constant radio contact with each other and the police "land cruisers" on 24-hour patrol. The police patrol all waters of the harbor.

Wharves.–The Port of Seattle has more than 70 piers and wharves on both the outer harbor, including Elliott Bay, East, West, and Duwamish Waterways, and the inner harbor, including the Lake Washington Ship Canal, Lake Union, and Lake Washington. Most of the facilities in the inner harbor are privately owned and handle barge traffic almost exclusively. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 36, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported. (For information on the latest depths contact the Port of Seattle general office or the private operators.) All facilities described have direct highway connections, and most have plant trackage with direct railroad connections. Water is available at most of the wharves, but electrical shore power connections are available at less than half of the wharves. General cargo at the port is usually handled by ships' tackle. Special handling equipment, if available, is mentioned in the description of the particular facility. Shore-based hoisting equipment with capacities up to 200 tons are available to the public at Port of Seattle.

Of the facilities described, nearly two-thirds are owned by the Port of Seattle and leased to private operators. The port owns seven large general cargo facilities, including five which also handle containerized cargo, a grain elevator, and a large terminal for handling foreign automobiles.

In recent years, the bulk of Seattle's marine commerce has shifted from the Elliott Bay waterfront to the large marine terminals on East and West Waterways and to the newly developed terminals along both sides of the Duwamish Waterway S of Harbor Island. Many of the former general cargo piers on Elliott Bay no longer receive commercial shipping, operating now as shops, restaurants, stores, or simply as storage facilities.

Facilities on Elliott Bay:

Pier 91: N side of Elliott Bay at Smith Cove; 35 feet alongside, deck height, 18 feet; W side of pier (Berths H, I, J, K, L, M), 2,495-foot berthing space; E side of pier (Berths A, B, C, D, E, F), 2,495-foot berthing space, face of pier (Berth G), 357 feet long; 123,500 square feet covered storage on the pier. Piers 90 and 91 are backed by 189 acres of open and covered storage area; cold storage space available; shipment and receipt of general cargo, receipt of automobiles; operated by the Port of Seattle.

Pier 90: immediately E of Pier 91; 35 feet alongside, deck height, 18 feet; W side of pier (Berths 3, 5, 7, 9), 2,222-foot berthing space; E side of pier (Berths 2, 4, 6, 8), 2,222-foot berthing space; face of pier (Berth 1), 295 feet long; 391,000 square feet of covered storage on the pier, Piers 90 and 91 are backed by 189 acres of both open and covered storage area; shipment and receipt of commercial and military cargo; operated by the Port of Seattle.

Pier 86 (grain terminal); about 0.5 mile ESE of Pier 90; 600-foot offshore wharf providing 1,400-foot berthing space with dolphins; depths of 73 feet alongside; deck height, 20 feet; 4.2-million-bushel grain elevator, loading rate of 3,000 tons per hour; railroad trackage providing storage for about 175 railroad cars; operated by Cargill, Inc.

Pier 71 (47°36′59″N., 122°21′26″W.): N side, 485-foot berthing space, 18 feet alongside; face, 270-foot berthing space, 47 feet alongside; deck height, 19 feet; receipt of petroleum products by tanker, bunkering tankers, and loading of bunkering barges; owned and operated by Union Oil Co. of Calif.

Pier 66 (Bell Street Terminal) (47°36'40"N., 122°20'55"W.): deck height, 19 feet; N side (Berth 1), 240-foot berthing space, 9 to 28 feet alongside; face (Berth 2), 850-foot berthing space, 28 to 35 feet alongside; S side (Berth 3), 340-foot berthing space, 35 feet alongside; over 190,000 square feet of covered storage area; receipt of fish; general offices of the Port of Seattle; operated by the Port of Seattle.

Pier 64–65 (Lenora Street Terminal): immediately SE of Pier 66; deck height, 19 feet; N side of Pier 65 (Berth 1), 270-foot berthing space, 40 to 55 feet alongside; face (Berth 2), 185-foot berthing space, 55 feet alongside; S side of Pier 64 (Berth 3), 250-foot berthing space, 45 feet alongside; Pier 64 is the terminus of the Canadian Pacific Railway's passenger and freight cruises between Seattle and Victoria, B.C.; Pier 65 owned and operated by New England Fish Co.

Pier 63 (47°36'32"N., 122°20'39"W.): deck heights, 20 feet; N side, 400-foot berthing space, 12 to 65 feet alongside; face, 160-foot berthing space, 65 feet alongside; 31,000 square feet of covered storage area; in 1975, pier was in poor condition and not being used; owned by New England Fish Co.

Pier 62: immediately S of and connected to Pier 63; deck height, 20 feet; face, 130 feet long, 65 feet alongside; S side, 300-foot berthing space, 58 feet to bare alongside; 20,500 square feet of covered storage; in 1976, pier was in poor condition and not being used; owned by New England Fish Co.

Pier 52 (Washington State Ferry Terminal) (47°36'11"N., 122°20'19"W.): terminus of the ferry routes between Seattle and Winslow and Seattle and Bremerton. There are three ferry slips here with ferries operating 24 hours a day. (For information on routes or schedules, contact Washington State Ferries, Seattle Ferry Terminal, Seattle, Wash., telephone (206-464-7400).)

Pier 48 (47°36'01"N., 122°20'13"W.): deck height, 15 feet; N side (Berth 1), 610-foot berthing space, 35 feet alongside; S side (Berth 2), 520-foot berthing space, 35 feet alongside; face, 250 feet long; 112,000 square feet covered storage; 2 acres open storage; 100-foot transfer span for loading and offloading trucks and cars, terminus of the Alaska Marine Highway System operating between Seattle and SE Alaska; shipment and receipt of general cargo; operated by Port of Seattle and the Alaska Marine Highway System. Note: Vessels docking starboard side to the N side of the pier should use a tug; an anchor should be used when docking at either the N or S sides of the pier when S winds prevail.

Terminal 46, 42, 37 (47°35'41"N., 122°20'14"W.): 2,940 feet of berthing space; deck heights, 17 to 20 feet; 34 feet alongside; five 45-ton container cranes, fifteen 45-ton straddle yard cranes, four straddle carriers, forklifts, toplifts, and sidepicks; 83 acres open storage; receipt and shipment of containerized cargo; owned and operated by the Port of Seattle.

Pier 36 (47°35'24"N., 122°20'30"W.): N side, 1,080-foot berthing space, 34 feet alongside, deck height, 18 feet.

Pier 15 (47°35'18"N., 122°21'07"W.): 460-foot-long berthing space on each side of pier; 34 to 36 feet alongside; deck height, 19 feet; shipment and receipt of petroleum products, bunkering vessels; owned and operated by Mobil Oil Co. (W side) and Texaco, Inc. (E side). Caution should be exercised in approaching the E side of this pier to avoid the shoal which extends about 120 yards in a N direction from the base of the pier at a distance of about 120 feet from the pier.

Pier 3 (47°35'07"N., 122°22'03"W.): vessels moor across the faces of two piers; the E pier is 50 feet long at the face and the W pier is 40 feet long at the face; the distance between the easternmost and westernmost points of the two piers is 163 feet; 10 to 30 feet alongside; deck heights, 22 feet; a port landing is always made; receipt and shipment of creosote, pilings and lumber; owned and operated by the Wyckoff Co.

Pier 2 (47°35'00"N., 122°22'11"W.): Rail car barge facility capable of handling 100-foot by 400-foot barges; 30 feet alongside; served by a 550-foot-long causeway and 120-foot-long, two-track bridge on pontoons; four breasting dolphins for mooring; owned by Port of Seattle, operated by Alaska Hydro-Train Co.

Facilities on East Waterway:

Terminal 18: NE corner of Harbor Island; 4,226 feet of berthing space; 33 to 50 feet alongside; deck height, 17½ feet; 51 acres of paved, open storage including positions for 9,000 containers; over 108,000 square feet covered storage; three 45-ton and two 33-ton high-speed container cranes, 24 straddle carriers, one forklift; shipment and receipt of containerized cargo; owned and operated by the Port of Seattle.

Pier 34 (47°35'16"N., 122°20'30"W.): 650-foot berthing space; 30 feet alongside; deck height, 19 feet; shipment and receipt of petroleum products, bunkering vessels, replenishing bunkering barges; owned and operated by the Phillips Petroleum Co. **Note:** A submarine telephone cable extends from Pier 34 to Terminal 19, across the waterway; do not use an anchor in approaching this wharf.

Pier 32 (47°35'07"N., 122°20'30"W.): 433-foot berthing space, 30 to 33 feet alongside, deck height, 20 feet; shipment and receipt of petroleum products, bunkering vessels, replenishing bunkering barges; owned and operated by the Standard Oil Co. of Calif. **Note:** A submarine telephone cable extends from Pier 34 to Terminal 19, across the waterway. (Do not use an anchor in approaching this wharf.)

Terminal 19 (47°34'58"N., 122°20'41"W.) immediately S of Terminal 18; 1,060 feet long; receipt and shipment of general and containerized cargo; owned by the Port of Seattle, various operators. Note: Submarine telephone cables extend from Terminal 19 to Pier 34 and Terminal 25, across the waterway. (Do not use an anchor approaching this terminal.)

Pier 30 (47°35'00"N., 122°20'30"W.): 510-foot berthing space on S side of pier, 28 feet alongside, deck height, 19 feet; 83,000 square feet of covered storage; forklifts to 7½ tons; shipment and receipt of general cargo, receipt of newsprint; owned by the Port of Seattle and operated by Puget Sound Freight Lines.

Pier 28 (47°34'53"N., 122°20'30"W.): deck heights, 18 feet; Berth 1, N side of pier, 520-foot berthing space, 30 feet alongside; Berth 2, face of pier, 600-foot berthing space, 40 feet alongside; Berth 3, S side of pier, 850-foot berthing space, 40 feet alongside; a 50-ton traveling, revolving gantry crane serves Berths 2 and 3; 168,000 square feet of covered storage, about 132,000 square feet of paved, open storage; shipment and receipt of general cargo; owned and operated by the Port of Seattle.

Terminal 20 (47°34'39"N., 122°20'41"W.): continuous wharf over 3,000 feet long; Berths 1, 2, and 3, N end of terminal, each 563 feet long, 40 feet alongside, deck heights, 17½ feet; Berths 4 and 5, S end of terminal, each 630 feet long, 40 feet alongside, deck heights, 17 feet; three 50-ton traveling gantry cranes serve the entire length of the wharf, a 200-ton shear-leg derrick is at the S end of the terminal for heavy lifts, toplifters, and forklifts to 30-ton capacity; tank farm with capacity of over 2 million gallons has connections on the wharf for loading and unloading tallow and molasses, pumping rate 500 gallons per minute; over 210,000 square feet of covered storage, 16,000 square feet cold storage, about 16 acres of open, paved storage for 700 containers; general and dry bulk cargo, bulk tallow and molasses; owned by the Port of Seattle, various operators.

Terminal 25: opposite S end of Terminal 20; 1,600 feet of deep-draft berthing space and 300 feet of shallow-draft berthing space; deck heights, 18½ feet; Berths 1 and 2, N end of terminal, each 800 feet long, 47 feet alongside; a 468-foot berth at the S end of the terminal has depths of 17 to 35 feet alongside; three 45-ton container cranes, nine 45-ton straddle cranes, five forklifts, maximum capacity, 26 tons; 44,000 square feet covered storage; over 2 million cubic feet cold storage; 27 acres open storage; storage for 7,920 containers; shipment and receipt of containerized cargo, receipt of fish and fruit at S end of terminal; owned by the Port of Seattle; operated by American Mail Line, Booth Fisheries Corp., and Rainier Port Cold-Storage Co.

Facilities on West Waterway:

Pier 11 (47°34'57"N., 122°21'26"W.): 460-foot berthing space with dolphins, 32 feet alongside, deck height, 20 feet; shipment and receipt of petroleum products, bunkering vessels, replenishing bunkering barges; owned and operated by the Atlantic Richfield Co.

Terminal 5 (47°34'38"N., 122°21'36"W.):

Berth 2: N end of terminal, 560-foot berthing space, 30 feet alongside, deck height, 20 feet; four 60-ton traveling gantry cranes; owned by the Port of Seattle. In 1975, the pier was not in use.

Berth 3: 540-foot berthing space, 40 feet alongside, deck height, 19 feet; one 40-ton dockside gantry crane, cases of canned salmon carried by underground conveyor from a 105,000-square-foot transit shed to a 300,000-square-foot processing and storage warehouse; receipt of canned salmon from Alaska; owned by the Port of Seattle; operated by Salmon Terminals, Inc., a division of Olympic Steamship Co.

Berths 4, 5, and 6: 1,760-foot-long continuous wharf, 40 feet alongside, deck height, 19 feet; four 33-ton traveling gantry cranes; about 29 acres of paved, open storage, including positions for over 1,400 containers; shipment and receipt of containerized cargo; owned by the Port of Seattle; operated by Sea-Land, Inc.

Pier 8 (47°34'32"N., 122°21'26"W.): Berth 1, W berth; 700-foot berthing space, 32 feet alongside, deck height, 20 feet; Berth 2, SW berth; 635-foot berthing space, 32 feet alongside, deck height, 20 feet; two grain elevators, total capacity 2¼ million bushels; four loading spouts serving Berth 2 are connected by conveyor to grain elevators, total loading rate 15,000 bushels per hour; 224,000 square feet covered storage; shipment and receipt of grain, feed, and flour; owned and operated by Fisher Mills Inc. **Note:** Strong currents exist on ebb tide and during freshets at this wharf; a counter current of eddy exists at the N end of Berth 1. A cable area and pipeline extends across the Duwamish River from the S end of Berth 2.

Pier 7: Immediately S of Pier 8 on S end of West Waterway; 350-foot main wharf flanked by a 100-foot barge berth to the W and a 120-foot barge berth to the E; 32 feet alongside main wharf, deck height, 19 feet; one 40-ton gantry crane, one 2½-ton traveling, revolving hammerhead crane; shipment and receipt of general cargo; owned and operated by West Waterway Lumber Co. **Note:** Two tugs are recommended when docking at Pier 7.

Facilities on the Duwamish Waterway:

Lone Star Industries Wharf (47°34'07"N., 122°20'40"W.): 760-foot berthing space with dolphins, 11 to 18 feet alongside, deck height, 20 feet; one 13-ton traveling, revolving hammerhead crane serves the wharf; cement plant back of the wharf; a 318-foot barge berth with depths of 12 feet alongside is immediately S of the main wharf; shipment of bulk cement, receipt of lime, rock, slag, and sand; owned and operated by Lone Star Industries.

Terminal 105 (47°33'15"N., 122°20'31"W.): deck heights, 17 feet; N berth (Berth 1), 660-foot berthing space, 40 feet alongside; S berth (Berth 2), 450-foot berthing space, 15 feet alongside; about 7 acres open storage area. N berth used for general cargo, S berth for moorage of tugs; owned by the Port of Seattle and operated by Puget Sound Tug and Barge Co., and Crowley Maritime Corp.

Ideal Cement Wharf (47°33'20"N., 122°20'38"W.): 645-foot berthing space with dolphins, 37 feet alongside, deck height, 20 to 25 feet; quay wharf paralleling waterway just S of the offshore wharf is over 1,100 feet long with 30 feet alongside; one large crane travels the full length of the wharf, unloading rate 750 tons per hour; cement plant back of wharves; shipment of bulk cement, receipt of limestone and other dry bulk materials; owned and operated by Ideal Cement Co.

Kaiser Cement Wharf (47°32'58"N., 122°20'22"W.): offshore wharf, 551-foot berthing space with dolphins, 35 feet alongside, deck height, 20 feet; receipt of dry bulk cement; owned and operated by Kaiser Cement and Gypsum Corp.

Kaiser Gypsum Wharf (47°32'50"N., 122°20'11"W.): offshore wharf, 410-foot berthing space with dolphins, 30 feet alongside, deck height, 20 feet; conveyor extends from a receiving hopper on wharf to cement storage facilities in rear; shipment and receipt of bulk cement, receipt of gypsum rock; owned and operated by Kaiser Gypsum Co., a subsidiary of Kaiser Cement and Gypsum Corp.

Terminal 115: W side of Duwamish River, Georgetown Reach, immediately S of the Kaiser Cement wharf; 1,200-foot berthing space, 40 feet alongside, deck height, 20 feet; one 50-ton and one 35-ton traveling gantry cranes serve the full length of the wharf; 189,000 square feet covered storage; over 3 million cubic feet cold storage; used for the receipt of steel, fish and crab processing, and barge support operations; owned by the Port of Seattle; operated by Foss Alaska Line.

Foreign-Trade Zone No. 5 is in Seattle. (See chapter 1, Foreign-Trade Zones, and appendix for address.)

Supplies.–Marine supplies of all kinds are available in Seattle. Bunker fuel, diesel oil, and lubricants are available. Large vessels can be bunkered at Pier 91, Pier 71 (Union Oil pier), Pier 15 (Mobil and Texaco pier), Pier 34 (Phillips Petroleum pier on East Waterway), Pier 32 (Standard Oil Co. pier on East Waterway), and at Pier 11 (Atlantic Richfield pier on West Waterway). Bunkering may be done at other berths by tank barges. Water is available at most berths. N of Seattle, vessels may bunker at Point Wells or Edwards Point.

Repairs.–There are two large shipyards in the Seattle area, both on Harbor Island at the S end of Elliott Bay. The largest floating drydock, at a shipyard just W of the entrance to West Waterway, has a capacity of 18,000 tons, an overall length of 600 feet, a minimum clear inside width of 100 feet, and a depth over the keel blocks of 27 feet. Gantry cranes up to 50-ton capacity are available at the yard. Another shipyard, at the NW end of Harbor Island, has a drydock which is only slightly smaller. Smaller shipyards are on the Duwamish River and on Lake Union, in the inner harbor. There are larger drydocks at the Puget Sound Naval Shipyard in Bremerton, available for private use under certain conditions when not required by the Government.

Small-craft facilities.–In addition to the large Shilshole Bay Marina, mentioned earlier in this chapter, numerous small-craft facilities line the shores of Lake Union, Lake Washington, and the Lake Washington Ship Canal, in the inner harbor. (See the small-craft facilities tabulation on charts 18445 and 18447 for services and supplies available.)

Communications.–Interstate Highway 5 extends N and S, and Interstate Highway 90 extends E from Seattle; several State routes extend in all directions from the city. Ferry service for passengers and automobiles is available to many points on Puget Sound and to Alaska via the inside passage. Seattle is served by two important railroads, and by many steamship and towing companies. Many airlines have passenger and freight service to Seattle-Tacoma International Airport. Seattle is the major port for Alaska commerce, by both water and air carriers.

Chart 18447.–Lake Washington Ship Canal extends from Puget Sound through Shilshole Bay, Salmon Bay, Lake Union, Portage Bay, and Union Bay to deep water in Lake Washington. Federal project depth through the canal is 30 feet, which is generally maintained. (See Notice to Mariners and latest editions of charts for controlling depths.) The entrance to Lake Washington Ship Canal is marked by a lighted range, lights, and buoys.

A **speed limit** of 4 knots is enforced within the guide piers of the Hiram M. Chittenden Locks. A **speed limit** of 7 knots is enforced elsewhere in the Lake Washington Ship Canal, except in an area marked by four private buoys in the N part of Lake Union.

The **Hiram M. Chittenden Locks,** a double lock, and a fixed dam are at the narrows of the entrance to Salmon Bay, 1.2 miles in from the sound. The large lock, a two-chamber structure, has a clear length of 760 feet, width of 80 feet, lift of 21 feet, and depth over the lower miter sill of 29 feet. The small lock has a clear length of 123 feet, width of 28 feet, lift of 21 feet, and depth over the lower sill of 16 feet. Passage time is less than 30 minutes for large vessels and 5 to 10 minutes for small vessels.

A saltwater barrier extends across the E end of the E chamber of the large lock to reduce the intrusion of saltwater into Lake Washington and to conserve water. (See 207.750 (g), chapter 2, for navigation regulations for Lake Washington Ship Canal, the Hiram M. Chittenden Locks, and the saltwater barrier.)

Storm warning signals are displayed. (See chart.)

Salmon Bay extends for about 0.8 mile from the E end of the locks to the Ballard (15th Avenue) Bridge. There are numerous piers and floats with extensive small-craft facilities on the bay. Fishermen's Terminal, operated by the Port of Seattle, is immediately W of the Ballard Bridge. The terminal is the home port of a large commercial fishing fleet. Depths of 14 to 28 feet are alongside the piers. There are 550 berths for craft 24 to 100 feet long. Complete facilities for fishing boats are available at the 40-acre terminal, including electricity, gasoline, diesel fuel, water, net repair yards, and all types of marine supplies. Marine railways at the terminal can handle craft to 300 tons for complete repairs.

From Salmon Bay the canal leads E to **Lake Union,** which is about 1 mile long in a N-S direction and about 0.5 mile wide. Depths in the lake range generally from 32 to 49 feet. There is a 10-foot shoal about 200 yards offshore from the SW end of the lake; it is marked by a buoy. Four private buoys in the N part of Lake Union mark an unrestricted speed zone, which is used by boat builders around the lake as a testing area. The buoys are frequently repositioned; caution is advised when transiting the area. There are numerous marinas and repair facilities, and several commercial wharves from which various commodities are shipped by barge. The two piers of the Pacific Marine Center, the Pacific shipbase of the National Ocean Survey, are on the E side of the lake. The N side of the N pier has a 450-foot berth with 20 to 44 feet alongside; the S side has a 530-foot berth with 27 to 45 feet alongside. The N side of the S pier has a 355-foot and a 285-foot berth with 26 to 49 feet alongside, and the S side of the pier has a 340-foot and a 290-foot berth with 26 to 49 feet alongside.

A drydock company adjacent to the Pacific Marine Center has several floating drydocks, the largest of which has a lifting capacity of 3,500 tons.

Storm warning signals are displayed. (See chart.)

Portage Bay, E of Lake Union, is the site of two major yacht clubs and many slips and finger piers for small craft.

Storm warning signals are displayed. (See chart.)

Montlake Cut (Portage Cut) leads from Portage Bay past the conspicuous buildings and athletic stadium of **University of Washington,** on the N side, thence into **Union Bay,** and thence into Lake Washington.

Lake Washington Ship Canal is crossed by five bascule bridges and two fixed bridges. Clearances of the drawspans are 17 to 43 feet. (See 117.1b and 117.795, chapter 2, for drawbridge regulations and opening signals.) The drawbridges are equipped with radiotelephones; the bridgetenders can be contacted on VHF-FM channels 16 (156.80 MHz), 13 (156.65 MHz), or 10 (156.50 MHz). The fixed bridges have a least clearance of 127 feet. Cables crossing the canal have a least clearance of 155 feet.

Lake Washington, the large freshwater lake on Seattle's E side, provides deep and protected water over most of its length of nearly 16 miles. Its shores are studded with private piers and landings, and there are marinas and small-craft repair places at many locations.

There are few commercial installations. Except for a few oil wharves, commercial shipments are by barge. The largest wharf on the lake is the 457-foot offshore wharf of a tar and creosote company at **Port Quendall** on the E side, opposite the S end of Mercer Island. A lumber mill and creosoting plant are here. Extensive storage of logs is done at Port Quendall as well as at the N end of the lake.

The Lacey V. Murrow pontoon bridge crossing the lake between East Seattle on the N end of **Mercer Island** and the city proper has fixed spans at the E and W ends with clearances of 29 feet. The fixed highway bridge on the E side of Mercer Island, from Barnabie Point to the mainland, has a clearance of 65 feet. The E and W piers of a former fixed bridge are just SE of the existing fixed bridge.

A **091°55′-271°55′ measured nautical mile** has been established along the pontoon bridge to Mercer Island. The targets are painted on both sides of the bridge so that the courses can be run either N or S of the bridge.

Another pontoon bridge crosses Lake Washington about 3.2 miles N of the pontoon bridge to Mercer Island. This bridge extends from Foster Island on the S side of Union Bay to **Evergreen Point** to the E. The bridge has floating drawspans that provided an opening 100 feet wide, in 1974. (See 117.1b and 117.801, chapter 2, for drawbridge regulations and opening signals.) The fixed bridges close inshore, E and W, have clearances of 57 and 44 feet, respectively.

Combined **measured half nautical mile, nautical mile,** and **2,000-meter measured courses** have been established along the pontoon bridge from Foster Island to Evergreen Point on a bearing of **102°30′-282°30′**. The half nautical mile and nautical mile courses are marked on the N side of the bridge by 18-inch circles resembling an engineers target; the half nautical mile markers have green and white quadrants, and the nautical mile markers have red and white quadrants. The 2,000-meter course is marked by 1-by 3-foot green markers with 3-inch white vertical stripes on both sides of the bridge.

Houghton, at the NE side of the lake just S of Kirkland, is the site of a former shipyard. There are several unused oil piers in disrepair in this area and several marinas catering to yachtsmen.

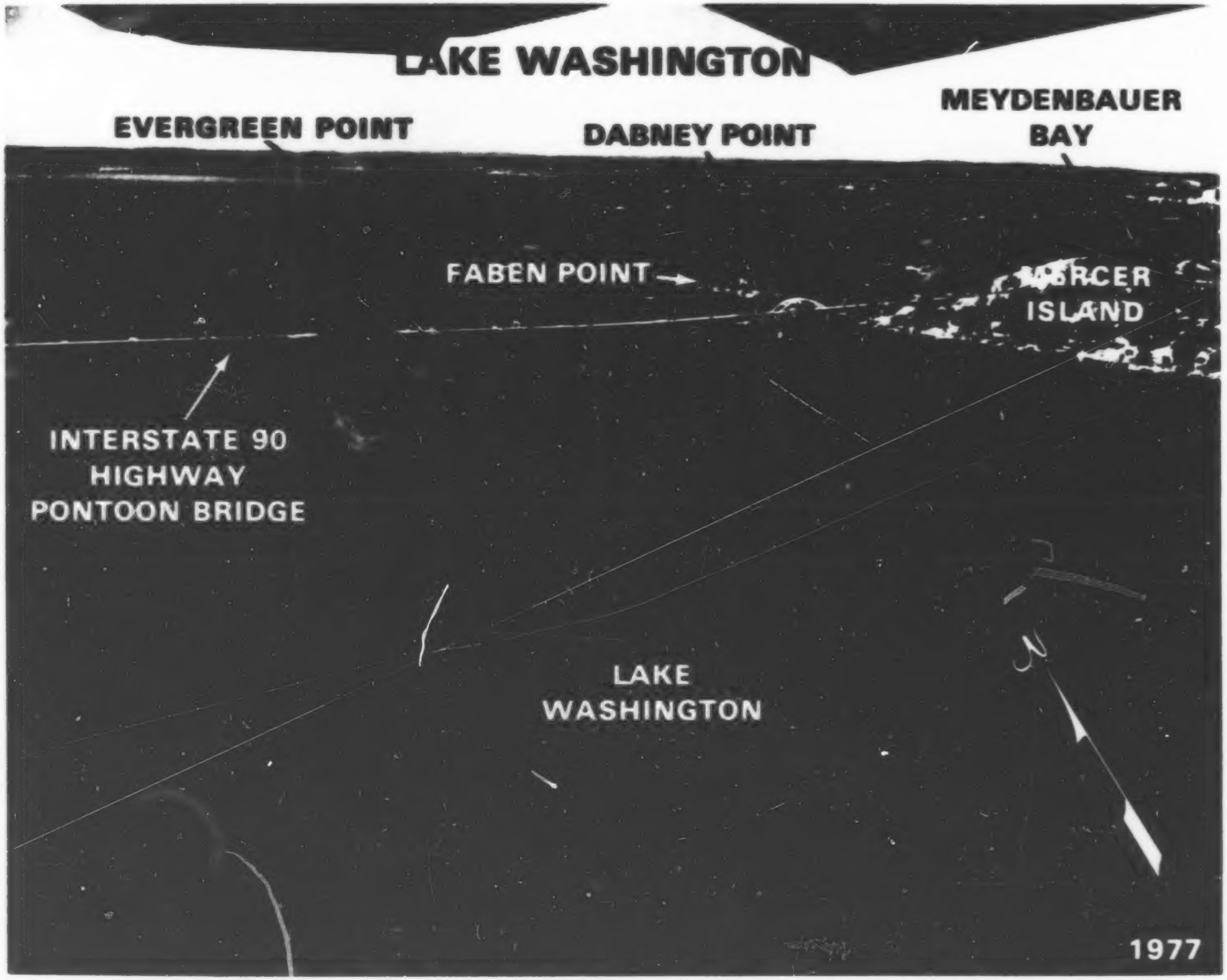
Juanita Bay, N of Kirkland, is a summer recreational area with several small piers.

The headquarters of the 13th Naval District and the Naval Support Activity Seattle are at **Sand Point** on the W shore of the lake just NE of Union Bay.

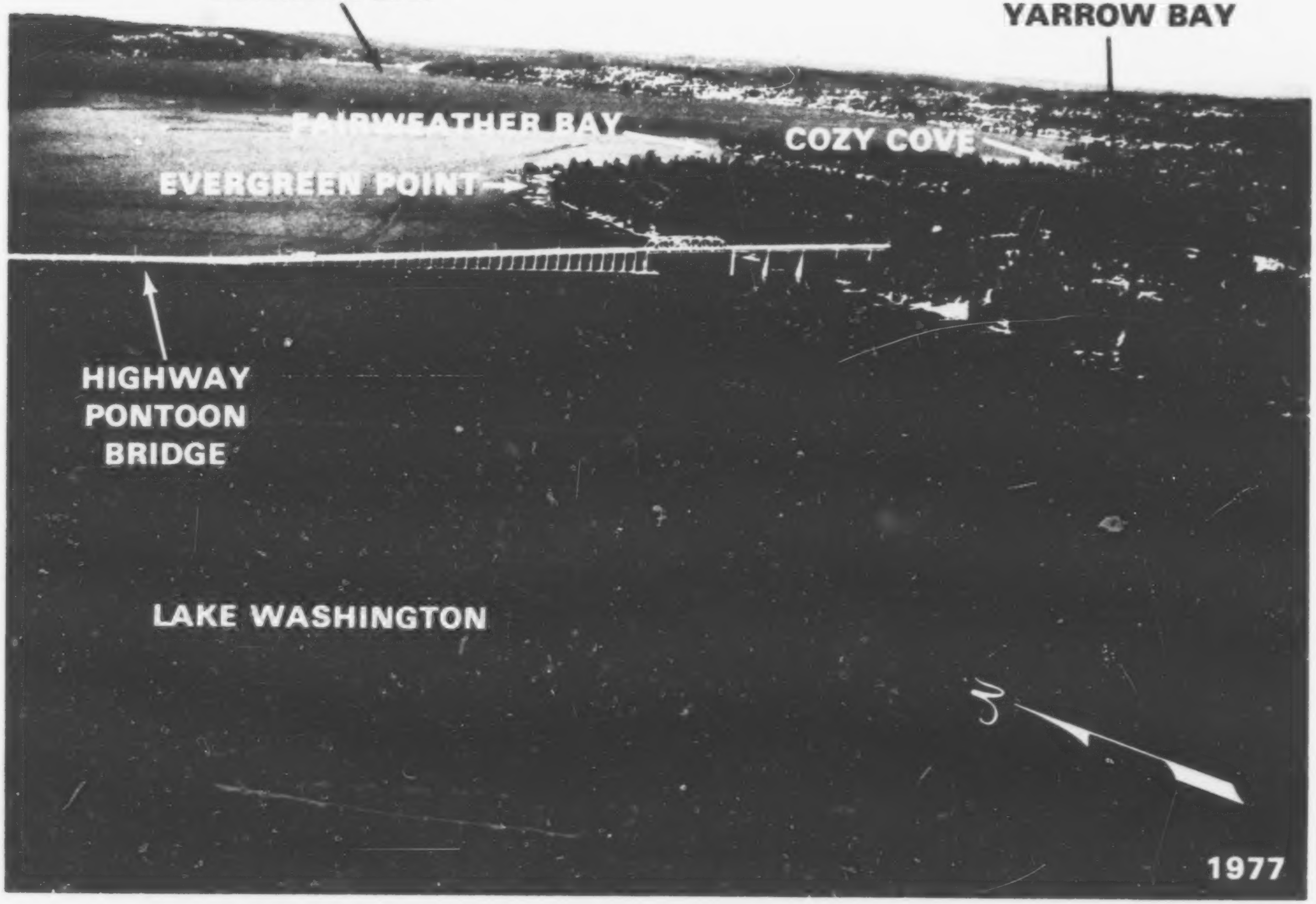
Chart 18441.–Possession Sound joins Puget Sound at the S point of Whidbey Island and extends in a general N direction for 10 miles to its junction with Saratoga Passage and Port Susan. From the entrance it extends for 3.5 miles with an average width of 2 miles, and then expands into an irregular basin about 6 miles in diameter. (See the beginning of chapter 12 for regulations governing vessels transiting gill net fishing areas.)

The E part of this basin is filled with extensive flats, many of which uncover and rise abruptly from deep water. These flats are intersected by several shifting channels, forming the mouth of the Snohomish River. The waters of the sound are generally deep, and the only anchorage used by large vessels is off the town of Everett, close inshore, in 10 to 15 fathoms.

Meadowdale, a residential area on Browns Bay, is

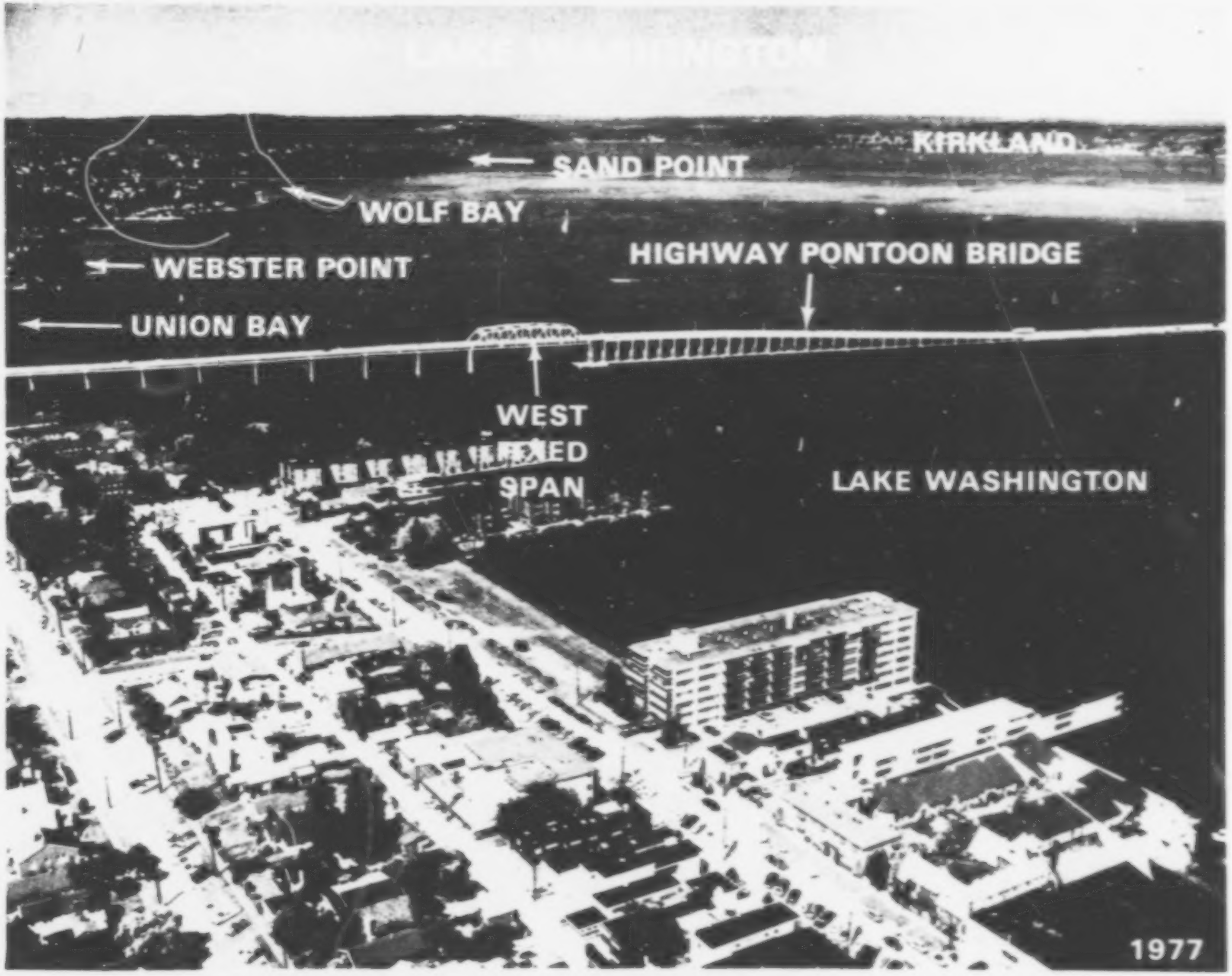

LAKE WASHINGTON
EVERGREEN POINT
DABNEY POINT
MEYDENBAUER BAY
FABEN POINT
MERCER ISLAND
INTERSTATE 90 HIGHWAY PONTOON BRIDGE
LAKE WASHINGTON
1977

LAKE WASHINGTON


JUANITA BAY
YARROW BAY
FAIRWEATHER BAY
COZY COVE
EVERGREEN POINT
HIGHWAY
PONTOON
BRIDGE
LAKE WASHINGTON
N
1977

343

BEST DOCUMENT AVAILABLE


KIRKLAND
SAND POINT
WOLF BAY
WEBSTER POINT
HIGHWAY PONTOON BRIDGE
UNION BAY
WEST FIXED SPAN
LAKE WASHINGTON
1977

on the E side of the sound about 4 miles S of Possession Point. There is a large fishing wharf here with a hoist that can handle craft to 21 feet. Several floats are available during the summer months; gasoline, covered storage for about 40 craft and a restaurant are also available. Reported depths of 5 feet can be carried to the hoist at the end of the wharf.

Glendale is a village on the W side of the sound 2.2 miles N of Possession Point. A resort here, open during the summer months, has gasoline, water, and ice. There is a marine railway here for launching small craft.

Chart 18443.–Elliot Point, on the E side of Possession Sound 4 miles NE of Possession Point, is a low spit projecting some 200 yards from the high land. **Mukilteo Light** (47°56.9'N., 122°18.3'W.), 33 feet above the water, is shown from a 30-foot white octagonal tower on the point; a fog signal is at the station.

Mukilteo is a town E of Elliot Point. An automobile ferry runs between Mukilteo and Clinton on Whidbey Island. A Government wharf for deep-draft vessels is at the Air Force fuel storage station 0.4 mile E of Mukilteo Light. The 10 tanks approximately in a line parallel to the beach are conspicuous.

There are several small-craft facilities at Mukilteo. Gasoline, water, and a launching ramp are available. Limited outboard engine repairs can be made.

Gedney Island, 3.5 miles N of Elliot Point, is about 1.5 miles long in an E direction, high, wooded, and prominent. From its E point, a shoal extends E, the 5-fathom curve being at a distance of 0.8 mile. Foul ground extends 0.2 mile from the S side of the E half of the island. A buoy is on the N side of the shoal area.

A fish haven, marked by a private buoy, is about 0.5 mile S of Gedney Island in about 47°59'48"N., 122°18'30"W. A marina, protected by a breakwater, is on the NE side of the island. The breakwater is marked by a private light.

Clinton, a village on **Randall Point,** is the Whidbey Island terminus of the ferry from Mukilteo. The town has several stores; a restaurant is near the ferry slip. Gasoline is available.

Chart 18444.–Everett, an important wood products shipping port, is on the E side of **Port Gardner,** 4 miles NE of Elliot Point. The several tall pulpmill chimneys and the Port of Everett's large alumina silo are prominent along the water.

Channels.–Depths of 28 feet or more are available to the main wharves in Port Gardner. A dredged channel with two settling basins extends inside a training dike and in the Snohomish River around the N half of the city to a lumbermill 6 miles above Port Gardner. The channel is marked by lights, buoys, and lighted and unlighted ranges. In 1979-June 1981, the controlling depths were 10 feet to the first settling basin, with 4½ to 7½ feet in the basin, thence 5 feet to a point opposite 19th Street and the NW end of the second settling basin (depths in the second settling basin are subject to continual change), thence 1 foot for a midwidth of 75 feet from the second settling basin to a point opposite the lumbermill.

Anchorages.–The general anchorage area is W of the waterfront. (See 110.1 and 110.230 (a)(4), and (b), chapter 2, for limits and regulations.) Vessels usually proceed to the wharves.

Tides.–The mean range of the tide at Everett is about 7.4 feet, and the diurnal range of tide is 11.1 feet.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Puget Sound from the Puget Sound Pilots or the Washington Pilots Association. (See Pilotage, chapter 12, for details.)

Towage.–Tugs up to 900 hp are available at Everett, and larger tugs may be obtained from Seattle. Arrangements should be made in advance through ships' agents.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Everett is a **customs port of entry.**

Harbor regulations are enforced by the manager of the Port of Everett, who serves as **harbormaster** and port warden.

Wharves.–The Port of Everett operates two deep-draft piers on Port Gardner and three deep-draft log loading piers on East Waterway. Two deep-draft pulpmill wharves are at Everett in addition to the port-owned facilities; wood products, hogged fuel, petroleum products, chemicals, and other commodities by barge are handled. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 37, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported. (For information on the latest depths, contact port authorities or the private operators.) All the facilities described have both direct highway and railroad connections. Water is available at most of the wharves, but electrical shore power is available only at Hewitt Avenue Terminal Pier 3. General cargo at the port is usually handled by ships' tackle. Special handling equipment, if available, is mentioned in the description of the particular facility.

Port Piers:

Hewitt Avenue Terminal Pier 1 (47°58'45"N., 122°13'20"W.): deck height, 18 feet; N side, 600-foot berthing space, 40 feet alongside; S side, 520-foot berthing space, 35 feet alongside; 93,000 square feet covered storage, 43,000 square feet paved open storage; a 35-ton traveling, multipurpose crane moves the length of the pier, unloading rate for bulk alumina 900 tons per hour; a 55,000-

ton capacity alumina silo is fed by a 1,300-foot conveyor system with a loading rate of 1,200 tons per hour; one 5-ton mobile crane, forklifts to 10-ton capacity, two lumber straddle carriers; also used for the receipt and shipment of general cargo; owned and operated by the Port of Everett.

Hewitt Avenue Terminal Pier 3: immediately N of Pier 1; 40 feet alongside; deck height, 19 feet; 17 acres open storage; shipment of logs and lumber, shipment of general cargo and machinery to Alaska; owned and operated by the Port of Everett.

Port of Everett Pier E (47°59'18"N., 122°13'07"W.): 450-foot berthing space each side; 40 feet alongside each side; deck height, 17 feet; receipt of rafted logs and mooring vessels. Owned by Port of Everett, operated by Dant & Russell, Inc.

Port of Everett Pier D: immediately W of Pier E; 500-foot berthing space each side; 40 feet alongside each side; deck height, 17 feet; one 35-ton whirley crane; receipt and shipment of rafted logs. Owned by Port of Everett, operated by Dant & Russell, Inc.

Port of Everett Pier B (47°59'07"N., 122°13'28"W.): N side 450-foot berthing space; 35 feet alongside; deck height, 17 feet; 35-ton gantry crane; shipment of logs, mooring of vessels. Owned and operated by Port of Everett.

Note: Although these piers are dredged to depths of up to 45 feet, the controlling depth on the approach to the piers is only 32 feet.

Norton Terminal Wharf (47°59'37"N., 122°13'22"W.): 700-foot berthing space; 37 feet alongside; 36,000 square feet of covered storage; 20 acres of open storage; receipt and shipment of bulk cargo.

Private Piers:

Weyerhaeuser Co. Main Wharf (47°58'34"N., 122°13'33"W.): 812-foot berthing space; 15 to 27 feet alongside; deck height, 21 feet; 32,800 square feet of covered storage; pipeline for caustic soda extends from wharf to storage tanks; pulpmill in rear; receipt of bulk liquid caustic soda by barge, shipment of woodpulp; owned and operated by Weyerhaeuser Co., Pulp Division.

Scott Paper Co. Dock (47°59'04"N., 122°13'06"W.): 730-foot berthing space with dolphins; 15 to 30 feet alongside; deck height, 20 feet; 34,000 square feet covered storage area; one 15-ton derrick, pulpmill in rear; receipt of woodchips and fuel oil, shipment of baled woodpulp; owned and operated by Scott Paper Co. **Note:** Vessels are requested to berth as far S as possible due to the loading of woodchip barges at the N end of the wharf; the usual berthing space available is 420 feet when the woodchip barge is at the wharf.

Supplies.–Water, provisions, and some marine supplies can be obtained. Gasoline and diesel fuel are available for small craft at Everett Yacht Harbor. Fuel oil for large vessels is available only by Seattle-based tank barges.

Repairs.–There are no facilities for repairs to deep-draft vessels in Everett; the nearest such facilities are in Seattle. There are several boatyards. The largest yard, on the E side of the yacht harbor, has a marine railway that can handle craft to 175 tons or 400 feet long for hull, engine, or electronic repairs. This yard has one 20-ton revolving gantry crane and a 10-ton bridge crane. Machine shops are available at the yard.

Everett Yacht Harbor, operated by the Port of Everett, is about a mile above the mouth of and on the E side of the Snohomish River Channel. The entrance to the harbor from the river channel is marked by two lighted markers. There are berths for more than 800 small craft; transient mooring floats are maintained for visiting boats. A boatyard is on the E side of the harbor. (See the small-craft facilities tabulation on chart 18423 for services and supplies available at Everett.) A **harbormaster,** whose office is on the N side of the harbor, assigns all berths. A Coast Guard vessel is berthed in the harbor.

Communications.–Everett is served by two railroads and by Interstate Highway 5. The county airport, Paine Field, is 6 miles SSW of the city.

Snohomish River, once heavily traveled by the light-draft river steamers and loggers, flows down through the dredged channel and settling basin near the yacht harbor and empties into Port Gardner just W of East Waterway. Traffic on the river above the yacht harbor consists of log tows, tugs and barges, and pleasure boats. Several pulp, plywood, and lumber mills are along the river. (See 207.770, chapter 2, for logging regulations.)

The Snohomish River is crossed by a railroad swing bridge with a least clearance of 9 feet about 0.6 mile E of Preston Point. U.S. Highway 99 crosses the river just above the railroad bridge and has a lift bridge with a least clearance of 38 feet. Interstate 5 crosses the river about 1.6 miles above the U.S. Highway 99 bridge; this fixed bridge has a clearance of 66 feet. (See 117.805, chapter 2, for drawbridge regulations and opening signals.) The practical limit of navigation on the Snohomish River is 0.8 mile above the Interstate 5 highway bridge.

Chart 18443.–The flats N of Everett at the mouths of **Steamboat Slough** and **Ebey Slough** are used for log storage. Steamboat Slough is crossed by a fixed bridge with a clearance of 41 feet and by three swing bridges with a least clearance of 7 feet. Ebey Slough is crossed by two fixed bridges and two swing bridges. Clearances on the fixed bridges are 41 feet; clearances on the swing bridges are 5 feet. (See 117.805, chapter 2, for drawbridge regulations and opening signals.) Overhead power cables with a least clearance of 53 feet cross Steamboat Slough. Navigation across the shallow flats should not be attempted without local knowledge. Local small craft navigate Ebey Slough to **Marysville.** A marina and boatyard are just E of the railroad bridge in the town. Moorage is available, and gasoline and diesel fuel are pumped. A marine railway can handle craft to 40 feet for hull and engine repairs. There is a public launching ramp just W of the Interstate 5 highway bridge at Marysville.

Sandy Point, the S point at the entrance to Saratoga Passage, is a low spit rising abruptly to 100 feet, with bluffs on each side; it is marked by a light.

Camano Head, 1.5 miles NNE of Sandy Point, is the SE point of Camano Island. A shoal, with a rock bare at low tide, extends nearly 0.2 mile SE from the point, and is marked by a buoy.

Tulalip Bay, 4 miles NW of Everett, is a small cove on the mainland. On the N side are the village of **Tulalip** and the agency buildings of the Tulalip Indian Reservation. The bay is shoal, with rocks extending more than 300 yards S and W from the point on the N side of the entrance. A buoy marks the edge of the shoal water W of the point at the S side of the entrance. Several small wharves and landing floats, mostly dry at low water, are at Tulalip; however, it has no public facilities. There are log-booming grounds in the S part of the bay. Mission Beach, immediately S of the bay, has several private boathouses and float landings.

Chart 18441.–Camano Island extends between Port Susan and Saratoga Passage. It is irregular in shape and 14 miles in length; the S portion consists of a long, narrow tongue that terminates in Camano Head, 340 feet high. At its N end it is separated from the mainland by **Davis Slough,** and South Pass and West Pass of the Stillaguamish River, all dry at low water. On the shores of the island are several resorts and unincorporated residential tracts.

Port Susan, on the E side of Camano Island, extends about 11 miles in a NW direction, terminating in flats which bare and extend over 3 miles wide at its head. There are several resort settlements. Deep water is throughout until nearing the head, where anchorage may be had off the extreme W edge of the flats in about 10 fathoms. Care should be used in approaching and anchoring, as the flats rise abruptly from deep water. A mussel raft, marked by a private light, is in the N part in about 48°10′20″N., 122°26′30″W.

Stanwood is in a dairying and farming district on the N side of the **Stillaguamish River** at the junction of **South Pass** and **West Pass.**

Saratoga Passage, on the W side of Camano Island, extends some 18 miles in a NW direction from its entrance between Sandy Point and Camano Head. At its N end it connects with Penn Cove and Crescent Harbor, and leads E into Skagit Bay. Depths in the passage are from 100 fathoms at the entrance to 15 fathoms at the Crescent Harbor entrance. There are few outlying dangers, and a midchannel course is clear.

There is considerable traffic in these waters, mostly pleasure and fishing craft, with occasional tugs bound to or from Deception Pass. This is a resort area; along the shores of the islands are several small marinas which provide gasoline, limited berths, launching ramps, and lodgings. Principal commercial products are lumber and fish.

Langley is a small town on Whidbey Island about 1.2 miles W of Sandy Point. A marina with a pier and mooring floats is at the S end of the town. Gasoline, water, ice, and some marine supplies are available. A hoist here can handle craft to 4 tons or 24 feet for outboard engine repairs. Tugs often anchor off the beach between Langley and Sandy Point.

East Point, 6 miles NW of Sandy Point, is a low sandspit about 300 yards long. It is marked by a light.

Elger Bay, on the W shore of Camano Island across Saratoga Passage from East Point, is an open bight 1 mile wide. Tugs anchor here in W and NW winds.

Holmes Harbor, entered 8 miles NW of Sandy Point, indents Whidbey Island 5 miles in a S direction. Except for a sand and gravel wharf and a large private boathouse at the head of the harbor, only private pleasure piers are on the shores of Holmes Harbor. Depths range from 30 to 40 fathoms off the entrance to 17 fathoms near the head, where good anchorage, except from N weather, may be had in mud bottom. A **general anchorage** is in Holmes Harbor. (See 110.1 and 110.230 (a)(3), and (b), chapter 2, for anchorage limits and regulations.) **Rocky Point,** at the E side of the entrance, is low but rises abruptly to 500 feet. **Baby Island** is a small islet 0.2 mile off the point. Shoals, marked by a buoy, extend NW from the island.

Greenbank, a small farming settlement, is on the W side of Holmes Harbor at the entrance. It has a store and service station. Anchorage against W weather is available off Greenbank in 12 to 18 fathoms, muddy bottom. **Freeland,** the business center for this area, is a small town at the head of Holmes Harbor.

Camano, a settlement on the E side of Saratoga Passage, is 3.5 miles NW of **Lowell Point.** A light is on **Onamac Point,** 0.8 mile N of Camano. At Madrona Beach, about 2 miles N of Onamac Point, there are two summer resorts at which gasoline is available. Both have marine railways that can handle craft to 20 feet.

Penn Cove indents the W shore of the basin at the head of Saratoga Passage and extends W for about 3.5 miles. In most weather, the cove affords good protection in 5 to 15 fathoms, good holding ground.

Off **Snatelum Point,** the S point at the entrance to Penn Cove, is a narrow spit extending N 0.5 mile, with ¼ fathom near its end. The spit is marked by a buoy.

Blowers Bluff, the N point at the entrance to Penn Cove, is bare, light-colored, high, and rounding. Rocks lie offshore 200 yards at places along the bluff. The shoal extending off the SW end of the bluff reaches almost one-third the distance across Penn Cove. Vessels should favor the S shore when passing this shoal.

Coupeville, the county seat of Island County, is on the S shore of Penn Cove, about 2 miles from the head. A tank on the S edge of town is prominent. The town has stores and service stations. A wharf here extends to about 12 feet; berthage and gasoline are available at floats attached to the E side of the wharf. Diesel fuel is available by truck. A rock covered 15 feet is about 300 yards NE of the wharf.

Chart 18428.–Oak Harbor, which indents the N shore of Saratoga Passage W of Crescent Harbor, is a semicircular cove about 1 mile in diameter with depths of 20 to 9 feet. **Maylor Point,** the E point of the entrance, is foul with several rocks, awash at low water, 0.5 mile SE from the point. The natural entrance channel is marked by lights, daybeacons, and lighted buoys. The town of **Oak Harbor** on the N shore of the harbor serves a farming community. The long wharf here is in ruins and not used; however, a small pier with moorage floats is just E of the pier in ruins. A marina, operated by the town, is on the E side of Oak Harbor. The marina is entered through the SW corner between a detached breakwater protecting the W side and a breakwater extending from the shore protecting the S side. The detached breakwater is marked by lights at both ends and a light in the middle; the S breakwater has a light at the outer end. A light is also at the end of the L-shaped pier just inside the entrance to the marina. Berthing, electricity, gasoline, diesel fuel, water, some marine supplies, and a lift up to 4 tons are available. Hull, engine, and electronic repairs can be made.

Crescent Harbor, immediately E of Oak Harbor, is a semicircular bight 2 miles in diameter, between **Forbes Point** and **Polnell Point.** Polnell Point, marked by a light, is wooded and rather bold, and connected to the main island by low ground, giving the point the appearance of an island from a distance off. A shoal extends about 0.9 mile W of Polnell Point; another shoal extends about 0.2 mile S from this point. Shoals extend about 0.7 mile S and E from Forbes Point; the S shoal is marked by a lighted buoy. Foul ground surrounds these points, but otherwise the harbor is clear, affording anchorage in 10 to 11 fathoms, muddy bottom. The harbor is exposed to the S. The large pier of the U.S. Naval Air Station, Whidbey Island, extends from the W side of the harbor. Depths of 26 feet are alongside the outer two-thirds of the pier. This pier can be used only with permission. Services and/or provisions cannot be provided, and ships' own power must be relied upon. A 183-foot T-pier used for fueling Naval vessels is on the N side of the main pier near the shoreward end.

Charts 18421, 18441, 18400.–The entrance to **Skagit Bay,** southern part, lies between Polnell Point and Rocky Point. The bay is about 12 miles long in a WNW direction. The greater portion of it is filled with flats, bare at low water, and intersected by numerous channels discharging the waters of Skagit River.

A natural channel varying in width from 0.2 to 0.6 mile and marked by lights and buoys follows the E shoreline of Whidbey Island to the N end of the bay. Shoal water extends off for some 100 to 300 yards from the E shore of the island. The N part of Skagit Bay is described in chapter 12.

The controlling elevation of the flats at the mouth of South Fork is about 2.5 feet above mean lower low water, and the controlling depth at low tide depends on the river stage, probably not exceeding 1 foot during periods of minimum flow. The diurnal range at the mouth of the river is 11.3 feet. The extreme range at this point is estimated to be 20 feet.

A fixed highway bridge with a clearance of 10 feet crosses the South Fork at **Conway,** 4.8 miles above the mouth.

Utsalady, a small village on the N shore of Camano Island about 1.2 miles E of Rocky Point, has a store and service station. Vessels may anchor just E of **Utsalady Point** in a small inlet between the shoal water of the flats and the shore in 3 to 6 fathoms, muddy bottom, with shelter from S winds. In the 1860's Utsalady became the first shipbuilding port in Puget Sound.

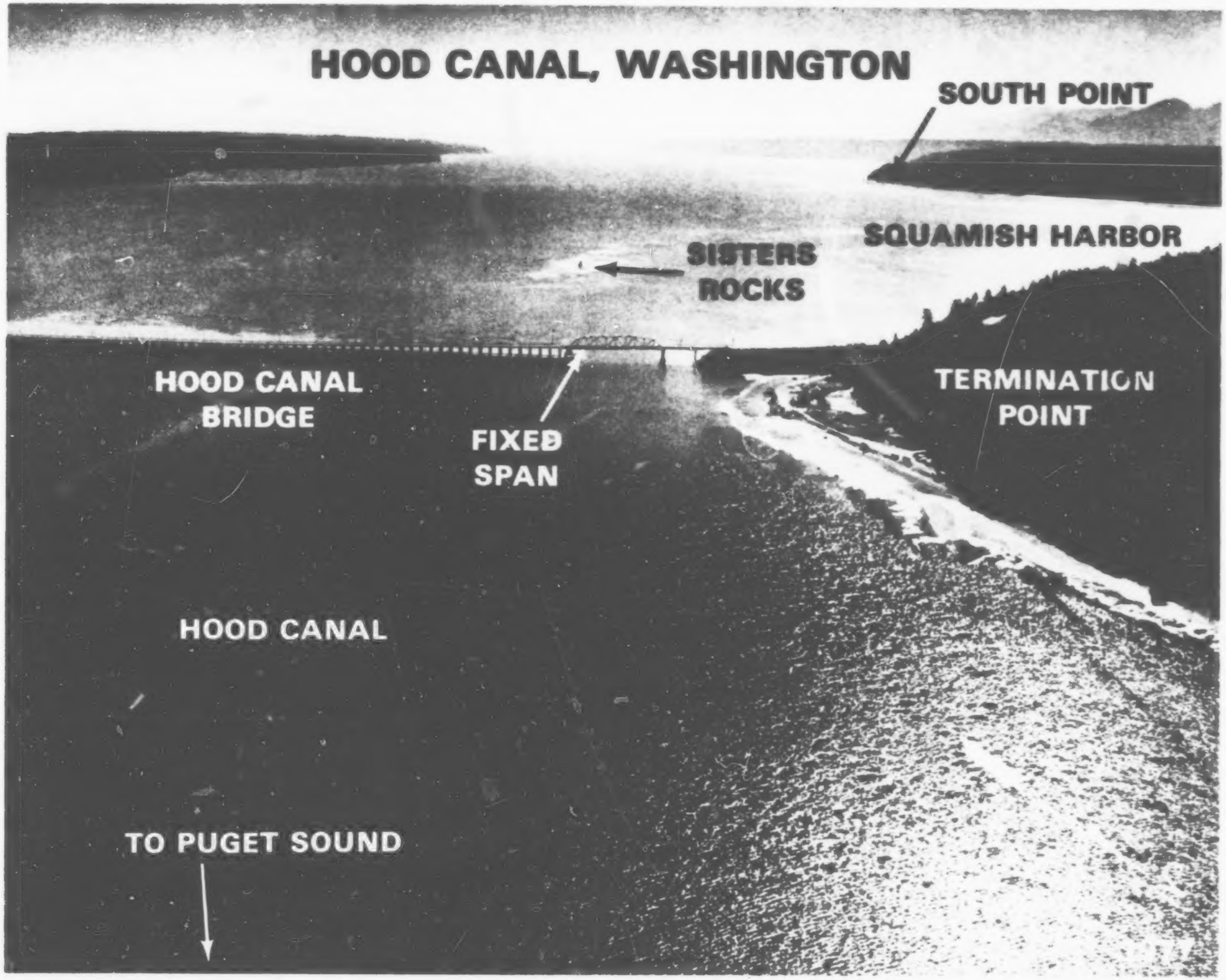
Strawberry Point, the E extremity of Whidbey Island, is marked by a light.

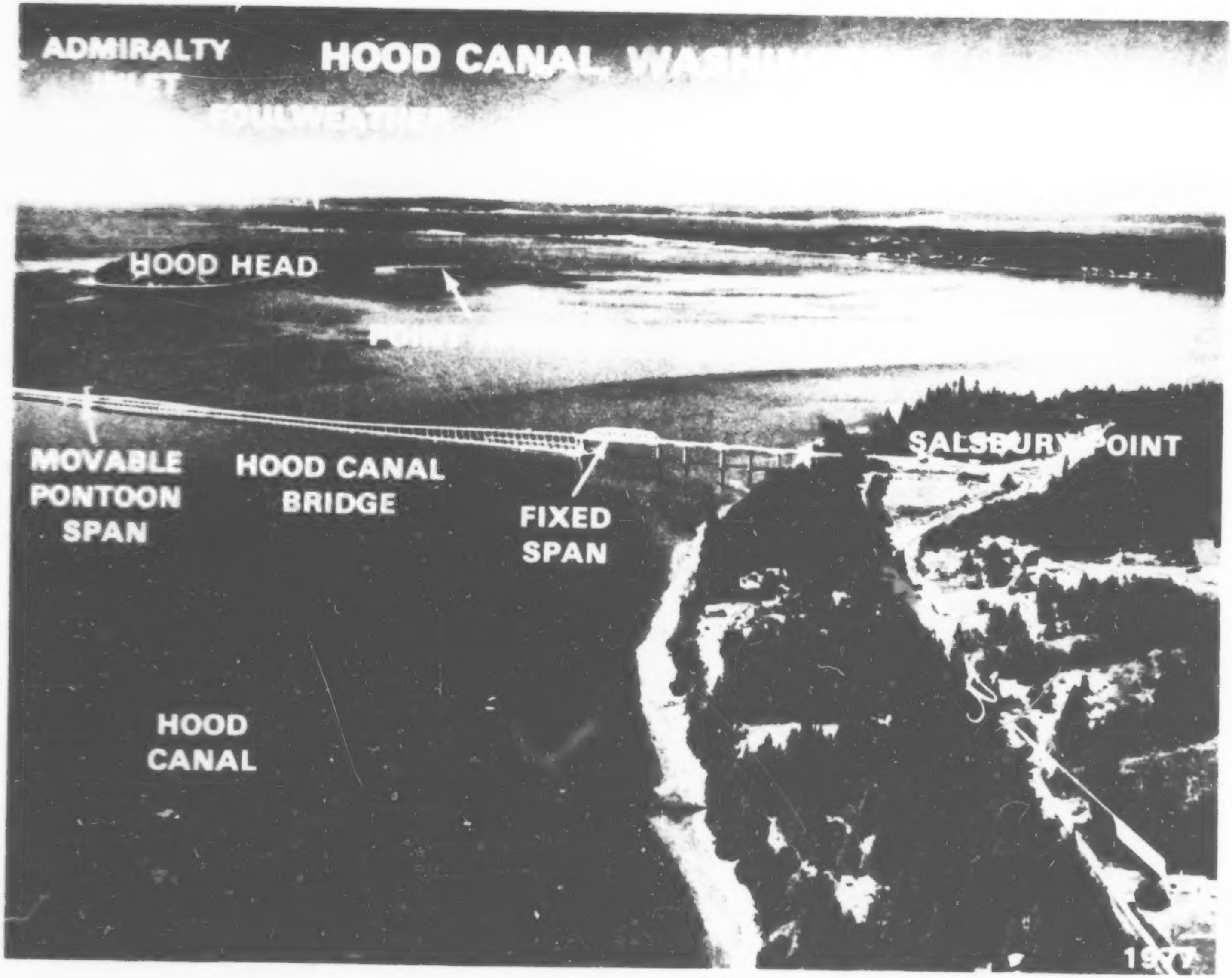
The **South Fork** channel leading into Skagit River winds through the flats N of Camano Island. Because of shoaling, however, the channel has largely been abandoned by boat traffic to Mount Vernon except for local outboard boats; **North Fork** is used instead. In December 1971, the mouth of the North Fork bared 2 feet at MLLW. There are several small-boat moorings along the banks of the river at **Mount Vernon.**

Chart 18440.–The entrance to **Hood Canal** is at the lower end of Admiralty Inlet, between Foulweather Bluff and Tala Point, about 10 miles S of Marrowstone Point. It extends in a general S direction for about 44 miles and then bends sharply NE for 11 miles, terminating in flats bare at low water. The head of Case Inlet, in the S part of Puget Sound, is less than 2 miles from the head of Hood Canal. The shores are high, bold, and wooded, and the water is deep, except at the heads of the bays and at the mouths of the streams. Many small craft ply these waters. There are mostly small float-landings and private docks in the canal. Gasoline, is available at numerous resorts and marinas.

U.S. Highway 101 follows much of the W shore of Hood Canal, and a connecting highway to Port Orchard follows the S shore of the S part of the canal around The Great Bend. There are road connections with Port Orchard and with the Puget Sound highway system from all the settlements on the E shore of the canal.

Water traffic in general is confined to tugs with log rafts, naval vessels in the upper part, and many pleasure craft. Hood Canal is a vacation area. Numerous private houses and summer cottages with small piers and floats are on both sides of the canal. There are relatively few public floats or piers, and


HOOD CANAL, WASHINGTON
SOUTH POINT
SQUAMISH HARBOR
SISTERS ROCKS
HOOD CANAL BRIDGE
FIXED SPAN
TERMINATION POINT
HOOD CANAL
TO PUGET SOUND


ADMIRALTY
INLET
HOOD CANAL WASH
FOULWEATHER
HOOD HEAD
MOVABLE
PONTOON
SPAN
HOOD CANAL
BRIDGE
FIXED
SPAN
SALSBURY POINT
HOOD
CANAL
1977

the only commercial activities are logging and some oystering.

Regulations governing vessels transiting gill net fishing areas are given at the beginning of chapter 12.

The **tidal currents** in Hood Canal at times attain velocities exceeding 1.5 knots. In some places in the canal the currents are too weak and variable to predict. At times there are heavy tide rips N of and around Foulweather Bluff, sufficiently heavy to be dangerous to small boats and to break up log rafts. This is most pronounced when the ebb current from the main body of Puget Sound meets that from Hood Canal off the point, and particularly so with the ebb against a strong N or NW wind. Off Point Hannon and Hazel Point, tide rips occur at times sufficiently strong to be troublesome to tugs with log tows. Current observations taken at a station in midchannel E of Hazel Point show that directions of both flood and ebb vary considerably at that location. At times SW winds from Hood Canal and N winds from Dabob Bay cause a chop dangerous for small boats. Under these conditions smoother water is found near either shore.

The dangers are few and generally close inshore. A few low sandspits from 100 to 300 yards long are difficult to see at night, but most of them have been made into resorts and the buildings nearby show up well against the background of trees. Flats off the mouths of streams extend as much as 0.5 mile offshore and are extensive at the heads of some of the bays. A midchannel course is clear until reaching The Great Bend, where Hood Canal turns E. Here the N shore just E of Ayres Point should be favored to clear the flats extending from the E part of Annas Bay.

Chart 18461.-Twin Spits are two long, low, sand points, 0.5 mile and 1 mile S of Foulweather Bluff. When waiting for smooth weather to round Foulweather Bluff, tugs with log tows often anchor in 50 feet 1 mile SE of the S spit, in a bight known locally as **Races Cove,** with Colvos Rock Light slightly clear of the end of the S point of Twin Spits. There is a small resort on the S spit; gasoline is available from the northernmost of two piers. A marine railway for small-craft, ice, and some marine supplies are available.

Hood Head, on the W side of Hood Canal 3 miles S of the entrance, is almost an island, having only a narrow strip of low sand connecting it with the W shore. The head is 220 feet high, steep and wooded, and is a prominent feature in the entrance.

A rocky ledge, marked by some kelp and covered 4 to 26 feet, extends more than 500 yards S of Hood Head; rocks covered 4 feet are near the S end of this ledge about 325 yards S of Hood Head.

Coon Bay, 2.5 miles S of Foulweather Bluff, is a small, nearly landlocked harbor offering excellent protection to small craft during periods of rough weather. The privately dredged entrance channel is narrow and has a reported controlling depth of about 3 feet. There are several private piers inside the entrance, but no facilities are available.

Point Hannon is at the E extension of Hood Head; it is marked by a light. A low sandy spit with shoal water extends about 200 yards E of the light.

Local magnetic disturbance.-Differences of more than 2° from normal variation have been observed in Hood Canal at Point Hannon.

Termination Point, 1.6 miles E of the village of **Shine,** is 1.7 miles SW of Point Hannon. A lighted transformer substation is on Termination Point.

Hood Canal Bridge, a pontoon highway bridge crossing the canal between Termination Point and Salsbury Point W of Port Gamble has two fixed openings; the clearance of the W opening is 35 feet, and that of the E opening is 55 feet. In the 600-foot center opening there are pontoons which are retracted for larger vessels. (See 117.1b and 117.784, chapter 2, for drawbridge regulations and opening signals.) A private fog signal is at each opening. Anchor cables, extending from the bridge pontoons to the canal bottom, extend nearly 500 yards both N and S of the bridge; anchoring should not be attempted in this area. In February 1979, the part of the bridge from the pontoon opening NW to Termination Point was severly damaged and sunk; caution is advised in the area.

Sisters, two rocks 200 yards apart, 0.5 mile S of Termination Point, are awash at about half tide. A light is on the S rock, 0.4 mile from the N entrance point to **Squamish Harbor,** an open bight just SW of Termination Point. Tugs frequently anchor near the head of the harbor in about 6 fathoms, muddy bottom. A ferry operates across Hood Canal from **Lofall** to South Point.

Case Shoal, partly bare at low water, is about 0.6 mile from and parallel with the W shore of Squamish Harbor. The shoal is marked at its N end by a daybeacon and on its SE side by a light.

Port Gamble Bay is a small bay on the E shore of Hood Canal 5 miles from the entrance. It is 2 miles long with a narrow entrance.

A dredged entrance channel leads from deep water in Hood Canal into deep water in Port Gamble Bay. In July 1981, the controlling depth was 24 feet. The channel is marked by a **001°-181°** lighted range and two lights on the E side of the channel.

Port Gamble, the town on the W shore at the entrance, is owned by the lumber company which maintains all facilities including the local housing, church, and store. The mill has been in operation for more than a century. The white church steeple and flagpole in the town are prominent. A shoal covered 4 feet is about 500 yards NE from the N end of the lumbermill wharf. The lumbermill wharf has a 385-foot face with reported depths of 29 to 35 feet alongside, a 400-foot berth at the S end of the wharf with 36 feet reported alongside and a 170-foot berth at the NW end of the wharf with 24 to 29 feet reported alongside. All deck heights are 14½ feet. Strong currents on both flood and ebb tide are experienced through the entrance channel to Port Gamble Bay. Vessels should dock against the current. Local knowledge and careful, precise piloting are essential in docking at this wharf.

Excellent anchorage may be had in the bay in 24 to 54 feet, muddy bottom.

Vessels should hold a midchannel course on entering Port Gamble Bay until 200 yards or more past the S light, and then head for the wharf, keeping the long E face open to avoid shoal water on the W side of the channel.

Caution.-The entrance channel to Port Gamble Bay is quite constricted by shoals on both sides of the channel. The two lights on the E side of the channel are in shoal water and do not mark the edge of the channel.

Charts 18458, 18441.-Thorndyke Bay is a small bight on the W side of Hood Canal about 4 miles S of Squamish Harbor. An **explosives anchorage** is S of the bay. (See 110.1 and 110.230 (a)(6), and (b), chapter 2, for limits and regulations.)

A dangerous wreck is about 0.4 mile off the E shore of the Hood Canal in about 47°47.9'N., 122°41.2'W.

Bangor Wharf on the E side of the canal, 3.5 miles S of Thorndyke Bay, is the property of the U.S. Naval Ammunition Depot. A **naval restricted area** surrounds the wharf. (See 207.750(e) and (f), chapter 2, for limits and regulations.) A **naval operating area** extends N and S of the wharf. (See 204.222 (a), chapter 2, for limits and regulations.) Private lights and a 500-foot radio tower are on the wharf. The tower is marked by flashing red aircraft obstruction lights of considerable power, and is reported to be a good night landmark.

Keyport Naval Undersea Warfare Engineering Station maintains a pontoon pier about 0.9 mile SSW of Bangor Wharf. Strong currents are reported within 500 yards of the pier. When these currents are accompanied by strong winds, landings at the pier are difficult, particularly when the wind and current are abruptly deflected by the nearby shore. Tug service is available and recommended. The water shoals rapidly inshore of the small-craft mooring bouys just S of the pier.

Bangor, a small residential community about 2 miles S of Bangor Wharf, has no facilities. A wharf in ruins and an old warehouse in poor condition are here.

Seabeck, about 6 miles SW of Bangor, is a settlement and resort at the head of **Seabeck Bay,** a small cove on the E shore. It has a store. There is a wharf here with a reported depth of 16 feet alongside. Berths, electricity, gasoline, diesel fuel, water, and ice are available. A 1-ton hoist can handle small craft up to 18 feet for engine repairs. Shoal water extends 0.5 mile from the head of the bay. Good anchorage, well protected from SE to SW weather, is available in the bay in 35 to 50 feet. Shoal water extends more than 200 yards off **Misery Point,** at the W side of the entrance of the bay. A light is about 300 yards NE of Misery Point.

Oak Head, 2 miles NNE of Misery Point and marked by a light, is the S point of **Toandos Peninsula. Hazel Point,** 1.8 miles ENE of Oak Head, is the turning point where the canal bends sharply from S to SW.

Fisherman Harbor is a cove on the S end of Toandos Peninsula, just E of Oak Head. It is very narrow, with a constricted entrance which is practically bare at low water. A sandspit extends partly across the entrance from the W shore.

Brinnon is a village on the S side of Dosewallips River, 3.5 miles W of Oak Head, at the entrance of Dabob Bay. It has a general store and service station. Gasoline, water, and ice are available, but there is no landing pier. A log booming ground is close offshore at Brinnon.

Dabob Bay, the largest inlet in the canal and separated from it by Toandos Peninsula, extends 9 miles in a N direction. The entrance is between **Tskutsko Point** and **Sylopash Point** just N of the mouth of Dosewallips River. A light is off Tskutsko Point. The W shore of Dabob Bay is particularly steep and bold, reaching an elevation of over 2,600 feet in less than 2 miles from the coast.

Anaval operating area is in the bay. Navy-maintained warning lights are shown from **Whitney Point** and Sylopash Point on the W side of the bay, and from **Point Zelatched** on the E side of the bay; flashing green lights will be shown when naval operations in the area require caution, and flashing red lights will be shown when naval operations close the area to navigation. Mariners are advised to pass no closer than 1 mile of naval vessels engaged in bottom operations unless directed otherwise by radiotelephone or other signal from the shore, picket boat, or surveillance aircraft. (See 204.222(b), chapter 2, for limits and regulations.)

A **restricted area** is off Whitney Point. (See 207.750 (o), chapter 2, for limits and regulations.)

Quilcene Bay is a small inlet on the W side of Dabob Bay N of Whitney Point. A light marks the E side of the entrance to the bay. The N half of the bay is filled with flats which bare. This part of the bay has two log booms and log storage areas. An oyster farm is on the E side of the bay just inside the entrance. Floats with mooring buoys evenly spaced along the E edge mark the oyster farm. **Quilcene,** a small town on the W side and near the head of the bay, is about 0.5 mile inland. The town has hotels, restaurants, and stores.

Quilcene Boat Haven, operated by the Port of Port Townsend, is on the W side of the bay about 1.4 miles S of the town. The entrance to the haven is protected by a stone breakwater; mooring floats and gasoline are available. The basin has a reported controlling depth of 10 feet. Two oyster farms are near the haven.

Pleasant Harbor is a small cove on the W shore of Hood Canal about 3 miles W of Misery Point. It is about 300 yards wide, and has a narrow shallow entrance. Owing to the narrowness of the entrance, boats should keep in midchannel until clear of the 6-foot shoal. A large marina inside the harbor has berths for about 90 craft, electricity, gasoline, water, ice, and limited marine supplies. Anchorage in about 36 feet, mud bottom is available inside the harbor. A large log dump and log boom, and a state park pier are in the harbor.

Triton Head, on the W shore, is 8.2 miles SW of

Oak Head. It is low, rocky, and timbered, with a reef that bares extending 200 yards N from the point. **Triton Cove** is a small cove formed by the head and the W shore, which affords anchorage for small craft against S winds. Oyster beds, marked by stakes and brush, are about 0.8 mile N from Triton Head on the flat which extends off the mouth of **Fulton Creek.** Two resorts just S of Triton Head have berths, gasoline, diesel fuel, water, ice, dry storage, and marine supplies. Hoists and railways to 10 tons are available, and outboard engine repairs can be made.

Chart 18448.-Holly (47°33.5'N., 122°58.6'W.), on the E shore of Hood Canal, is a settlement on the S side of a small bight about 10 miles SW of Oak Head. There are no facilities here. Shoal water extends about 300 yards N and E from the S shore of the bight. **Anderson Cove** is the shallow cove directly N of Holly. It is used for rafting logs.

Eldon is a W shore settlement on the S bank of **Hamma Hamma River,** about 3 miles SW of Holly. There is a large tourist camp here. The delta flats of the Hamma Hamma River extend nearly 0.5 mile from shore. Unmarked jetties extend from the river through the flats into Hood Canal and constitute a potential hazard to small craft. There is an extensive log booming ground and dump at the mouth of Jorsted Creek, about 1 mile S of Hamma Hamma River.

Lilliwaup is a village on the S shore of **Lilliwaup Bay,** a small shallow cove on the W shore of Hood Canal about 6 miles SW of Eldon.

About 1 mile S, there is a resort at which berths, electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. A 1½-ton elevator at the resort can handle craft to 19 feet long for hull and engine repairs.

Dewatto is a small settlement on the S side of **Dewatto Bay,** a small, shallow cove on the E shore opposite Lilliwaup.

Hoodsport, the largest town on Hood Canal, is on the W shore 4 miles SW of Dewatto. It has a State fish hatchery.

Hoodsport Marina, with a pier, floats, and a 3½-ton elevator, has depths of 24 feet reported off the end of the lift area. Berths, electricity, water, ice, and marine supplies are available. Hull and engine repairs can be made. Just N of the marina is a public pier with floats.

Potlatch is a small town on the W side of the canal about 2 miles S of Hoodsport and opposite **The Great Bend,** where Hood Canal turns NE. The large gray building of a hydroelectric powerplant, connected to a standpipe on the mountain above by three pipelines, is very prominent on the W shore 0.5 mile S of the town. There is a recreation park and small-craft launching ramp just S of the powerplant.

Union is a town with several stores on the S shore of The Great Bend. There are two marinas here; one has a 4-ton hoist that can handle craft to 30 feet long for hull and engine repairs. Both have berths, electricity, gasoline, water, ice, marine supplies, and facilities for making hull and engine repairs. Depths alongside the floats at these marinas are reported sufficient for small craft at all stages of the tide; however, the easternmost of the two marinas should be approached from the NE to avoid shoal water and snags. A large resort in the cove on the S shore 1.3 miles E of Union has a T-pier with a 600-foot face and reported depths of 15 feet alongside. Berths, electricity, gasoline, and water are available at the resort. A large motel and restaurant are here.

Annas Bay, immediately W of Union, is a broad, open bight; the E half is flat and bare at low water. This flat extends about 0.2 mile into the canal immediately W of Union and is formed by the **Skokomish River,** which empties at the head of the bay.

Tahuya, a small town on the N shore of The Great Bend 1.8 miles NE of Union, has a resort with a pier and floats. Electricity, gasoline, water, a 1½-ton hoist, and a launching ramp are available. Reported depths of 2½ feet are off the floats. **Twanoh State Park,** about 6 miles E of Union on the S shore, has three launching ramps and a pier with reported depths of 2½ feet off the end. A small marina, operated during the summer is about 2 miles E of Twanoh State Park on the N shore. A pier with mooring floats, gasoline, and water are available. A float where gasoline is available is about 2.5 miles from the head of Lynch Cove on the N shore, and about 0.5 mile SW is a public pier with floats operated by the **Port of Allyn.** The end of the pier is marked by lights. A reported depth of 10 feet is off the end of the float.

Hood Canal terminates in **Lynch Cove.** Flats, mostly bare at low tide, extend for about 2.2 miles from the head of the cove.

Charts 18446, 18449.-Port Orchard is an extensive body of water, W of **Bainbridge Island,** 15 miles long. Its N end connects with Port Madison through Agate Passage. At its S end Port Orchard connects with Puget Sound through Rich Passage. The depths in the main body of Port Orchard range from 36 to 150 feet with few dangers and these, as a rule, are close inshore. The shores are moderately low and wooded. Villages and numerous cottages line the shores.

Current observations taken in midchannel about 1 mile S of **Tolo** indicate that the tidal current in that locality is very weak.

Chart 18446.-Agate Passage is the N entrance to Port Orchard and connects it with Port Madison. The channel extends about 1 mile in a SW direction. The depth is about 20 feet. The passage is straight; the shores are wooded and fairly steep-to; the shoreline is mostly rocky and fringed with kelp to Point Bolin. The currents have velocities up to 6 knots; the flood sets SW and the ebb NE.

The passage is obstructed by a shoal, marked by a buoy, near the middle of the N end with depths of 9 to 10 feet, and there are other depths of 14 to 18 feet almost in midchannel.

The N entrance is marked by a light on the W side of the channel opposite **Agate Point;** a lighted buoy marks the channel through the passage and a light marks a shoal NE of **Point Bolin.**

A fixed highway bridge, 0.7 mile S of Agate Point, has a clearance of 75 feet for a midwidth of 300 feet. Overhead power cables cross the passage on both sides of the bridge; least clearance is 96 feet.

Liberty Bay is a narrow inlet extending about 4 miles in a N direction from the NW part of Port Orchard. The SE half of the bay is narrow and tortuous. The shores are low and wooded; the shoreline is mostly sand and gravel. There are mud flats at the head of the bay and in the small bight on the S side of the bay. Mud is the predominating bottom characteristic. The current velocity is 0.8 knot N of Keyport, in the narrow entrance to the bay. Velocities exceeding 1 knot occur at times.

The **Keyport Naval Underwater Warfare Engineering Station (NUWES)** on the W side of the entrance to Liberty Bay has two piers. A seaplane float extends 100 feet NW from the end of the N pier. Mariners are requested not to exceed 5 knots when passing the S pier, and not to exceed 3 knots when passing the N pier. Several buildings are prominent at the station.

A **torpedo test area** extends off the shore between Brownsville and Keyport NUWES. Flashing red lights on Navy range vessels between Keyport and Brownsville and atop a building at the seaward end of the S pier at Keyport NUWES indicate torpedo firings, or that noise measurement tests are in progress, or that conditions are generally hazardous to mariners. When lights are flashing, mariners should not enter the test area. Mariners near the area should stop engines, or other equipment generating underwater noise, such as depth sounders, because some torpedoes are guided by noise and may be attracted to the boat noises. (See 207.750 (j), chapter 2, for limits and regulations of the restricted area.)

Keyport is on the S side of the passage leading to Liberty Bay. A power cable with a clearance of 90 feet crosses the passage at Keyport. There is a pier with a float for small craft. A store with gasoline pumps is at the head of the pier.

Poulsbo, a fishing and pleasure resort on the E shore at the head of Liberty Bay, is the principal town of the area. The small-craft harbor at Poulsbo, protected on the S and W sides by an angled timbered breakwater, can accommodate about 270 fishing boats and pleasure craft. The breakwater is well marked by private lights. Piers and floats are in the harbor; depths are about 12 feet at the outer floats. Electricity, water, ice, a launching ramp, and hull repairs are available at the basin. A yacht club and a restaurant are here. The stores of the town business district are nearby, and all types of supplies may be obtained. A tall church steeple on the hill NE of the harbor is prominent.

Oysters are cultivated on the flats at the head of the bay. There is an oyster company plant about 0.6 mile SE of the Poulsbo. A covered rock is about 175 yards SE of the oyster wharf.

Manzanita is a settlement on the W side of Bainbridge Island in a small cove about 2 miles S from Agate Passage. **Manzanita Bay,** S of the town, affords an excellent anchorage for small craft in 27 feet, mud bottom. There are several private wharves and floats in the bay. Caution is urged to avoid rows of submerged piling on each side of the bay, about midway in from the entrance.

Battle Point, a sandy spit on the E side of Port Orchard about 1.7 miles S of Point Bolin, marks the turn in the direction of the channel from SW to S. A light is off the end of the spit.

Brownsville, on the W shore of Port Orchard, is on the N shore of **Burke Bay,** about 1.2 miles SW of Battle Point. Brownsville has a marina with berths for about 250 vessels. Transient berths are available. The reported depth alongside is 8 feet. Electricity, gasoline, diesel fuel, water, ice, and supplies are available. The marina has a marine railway that can handle craft for hull and engine repairs up to 26 feet. The **harbormaster's** office is on the second floor of the town store. All of Burke Bay bares, but it may be entered by small craft at about half tide.

Chart 18449.–Illahee is a small settlement on the W shore of Port Orchard about 3.0 miles S of Battle Point. The town has a wharf and stores. A fish haven, marked by buoys and extending about 140 feet from the outer end of the wharf, provides marine habitat improvement for scuba diving and public fishing; mariners are advised to use caution. About 1 mile S of Illahee at **Illahee State Park** is a public pier with floats for small craft and a launching ramp. Three U.S. Navy-maintained deperming ranges, each on a bearing of 022°-202° and marked at the ends by lighted mooring buoys, are in midchannel E of Illahee.

Fletcher Bay is a village on the E shore of Port Orchard about 1.2 miles S of Battle Point. Small boats can enter the bay at three-quarter tide and find anchorage in 12 feet, mud bottom; the swinging area is limited. The bar across the entrance bares at half tide.

The E and principal approach to Port Orchard from Puget Sound is S of Bainbridge Island through Rich Passage, between Restoration Point and Blake Island. It is deep and almost free from dangers, except for **Bainbridge Reef,** covered 36 to 55 feet, and currents in the constricted W part of Rich Passage. Bainbridge Reef is marked at the SW end by a lighted buoy.

Orchard Point, the S point at the entrance to Rich Passage, is marked by a light and fog signal. A **general anchorage** is in the vicinity of the point. (See 110.1 and 110.230 (a)(11), and (b), chapter 2, for limits and regulations.)

Rich Passage is about 3 miles long, with a sharp bend near its W end, where it narrows to 0.2 mile. **Orchard Rocks,** some 400 yards in extent, are on the N side of the channel just inside the E entrance. A small area near the center of the reef, which uncovers, is marked by a daybeacon. The rocks are marked off their S end by a lighted buoy. The reef off **Point Glover** is marked by a light and fog signal. **Waterman Point,** at the W entrance, is marked by a light and fog signal. A light marks the S edge of the shoal extending from **Point White,** the N point at the W entrance.

Currents.–Continuous observations in midchannel between Point Glover and Point White and at other points in the passage indicate that: Current velocities increase from E to W in Rich Passage reaching a maximum average velocity of 2.4 knots on the flood and 3.1 knots on the ebb at the W end off Point White. The strongest observed currents were 4 knots on the flood and 5 knots on the ebb. Ferry pilots on the regular daily run between Seattle and Bremerton advised that on rare occasions they have experienced ebb currents of "at least" 6 knots in the vicinity of Light 10.

Near the time of slack, the average period when the velocity does not exceed 0.2 knot is about 20 minutes. For strong currents these periods will be decreased; for weak currents they will be increased.

In the channel off Orchard Point, at the E end of Rich Passage, the velocity of the flood is 0.8 knot and on the ebb, 1.1 knots. Off Pleasant Beach the velocity of the flood is 1.3 knots and on the ebb, 2.8 knots.

On the flood, the lines of stream flow are nearly uniform except off the bight just NW of Middle Point and in the large cove on the N shore opposite Point Glover. Eddies do form in those two places, but they do not extend outward to the usual vessel track. On the ebb, however, extensive eddies and countercurrents do occur, owing to the funnel-shaped configuration of the passage.

Between Middle Point and Point Glover, an extensive eddy extends from shore almost to midchannel, and will frequently be encountered by vessels on the track between Orchard Rocks and Point Glover buoys.

An eddy fills the cove on the N shore opposite Point Glover, but does not extend outward to the vessel track.

An eddy occurs about 0.2 mile SSW of Point White and a little N of midchannel at the W entrance to the passage. A weak countercurrent occurs inshore along the SE side of Point White.

These eddies and countercurrents on the ebb greatly diminish the effective width of the passage, and so increase the velocities in the channel.

Strangers should not attempt to navigate Port Orchard, and particularly Rich Passage, in thick weather on account of the strong tidal currents. In clear weather, however, the navigation of these waters presents no unusual difficulty.

Caution.–Rich Passage, because of activities of the Puget Sound Naval Shipyard, has a large volume of traffic. Many ferries a day each way, tugs with hawser tows, and various types of naval craft, all contribute to create a considerable collision hazard in the passage, particularly at the sharp bend off Point Glover. Strong tidal conditions prevail in this vicinity, and deep-draft outbound vessels making the sharp turn may be unavoidably set well over toward the E shore, necessitating a two-blast, starboard-to-starboard meeting with inbound vessels. Vessels approaching Point Glover from either direction should sound one long blast when within 0.5 mile of the point as a warning to any vessel approaching from the opposite direction.

Fort Ward, formerly a military post and now a State park on Bainbridge Island, is near the E entrance to Rich Passage, just inside Beans Point. There is a wharf here built out to 18 feet. A fish pen off the end of the wharf is marked by private lights. A rocky patch covered 11 feet, 150 yards S of the wharf, is dangerous to vessels approaching from southward. A radio tower just NE of Fort Ward and a large white house on **Beans Point** are prominent from the E end of Rich Passage.

Chart 18452.–Sinclair Inlet, site of the city of Bremerton and the Puget Sound Naval Shipyard, is entered from Rich Passage and Port Orchard on the E, and Port Washington Narrows on the N. The inlet is 3.5 miles long, extending in a WSW direction from **Point Herron,** which is at the junction of Port Washington Narrows and Port Orchard. The point is marked by a light and fog signal. Several Navy-maintained unlighted mooring buoys, used at times by unlighted craft, are in Sinclair Inlet. Mariners are advised to exercise caution at night.

East Bremerton is the community back of Point Herron, on the E side of the Port Washington Narrows entrance. The fixed highway bridge crossing the narrows here has a clearance of 82 feet.

Sinclair Inlet is a **naval restricted area.** (See 207.750 (k), chapter 2, for limits and regulations.)

Annapolis is a village on the S shore of Sinclair Inlet directly S of Point Herron. A long pier, formerly a ferry pier, is in ruins and is not used. E of the ferry pier is a public float and launching ramp. The float grounds at low water. The buildings of a veterans' home on the bluff above the town are prominent.

A flat that bares extends about 0.2 mile from shore in the bight between Annapolis and Port Orchard.

The town of **Port Orchard** is on the S shore just W of Annapolis. It has a ferry pier, float landing, and a marina. Passenger ferry service is maintained with Bremerton. A marina, W of the ferry pier and marked at its entrance by private lights, has covered and open berths for about 330 small craft. Transient berths are available at the marina. Electricity, water, gasoline, diesel fuel, and pumpout facilities are at the marina; ice and supplies can be obtained nearby. A small-craft moorage and boatyard have berthing for about 25 vessels on the W side of town; electricity, water, and diesel fuel are available. The yard has a marine railway that can handle craft up to 65 feet. Hull and engine repairs can be done at the boatyard; a machine shop and carpentry shop are available. Port Orchard Yacht Club has its moorings W of the boatyard. A floating breakwater in ruins, a wreck, and other sunken debris are about 75 yards off the ends of the Yacht Club floats. Another marina and boatyard, just W of Port Orchard Yacht Club, can accommodate about 25 vessels. A mobile hoist with a 30-ton capacity can handle craft up to 55 feet. Electricity, gasoline, water, and limited marine supplies are available at the marina.

A marina and boatyard, about 1.5 miles W of Port Orchard, has berths for about 50 fishing boats and small craft. Electricity, gasoline, water, and limited marine supplies are available. The boatyard has three marine railways, the largest of which can handle craft to 30 tons for hull repairs.

Puget Sound Naval Shipyard occupies most of the N shore of the inlet. The hammerhead crane near the offshore end of Pier 6 of the yard is one of the most conspicuous objects from any direction.

The Navy graving dock is one of the largest in the world. Its inside dimensions are 1,152 feet long, 165 feet wide at the entrance measured 6 feet over sill, and 53 feet over the sill at mean high water. This facility was built to accommodate the largest supercarrier. When not committed to Navy use, and under certain conditions, the graving dock may be used by other ships that are too large for commercial docks.

Bremerton adjoins the shipyard, and most of the city's business and affairs are keyed to the needs of the Navy establishment. The city limits include East Bremerton and Point Herron. Frequent ferry service connects with Seattle. Floats for small craft are adjacent to the N ferry slip.

Chart 18449.–Port Washington Narrows, 3 miles long, joins Sinclair and Dyes Inlets. Tidal currents in the narrows attain velocities in excess of 4 knots at times. (See Tidal Current Tables and Tidal Current Charts for detailed information.)

There are a number of petroleum distribution facilities with storage tanks and receiving wharves along the W shore of Port Washington Narrows between the S bridge over the narrows and Phinney Bay.

Two fixed highway bridges and two power cables cross the narrows. The Bremerton-East Bremerton Bridge, the S bridge, has a clearance of 82 feet. A power cable with a clearance of 90 feet is about 0.3 mile N of the bridge, and a second power cable with a clearance of 80 feet is close E of the N highway bridge. The N bridge has a clearance of 80 feet.

A marina is on the S side of the Bremerton-East Bremerton Bridge at East Bremerton. Gasoline, water, ice, and some marine supplies are available. A marine railway here can handle craft to 42 feet for minor hull and engine repairs.

Anderson Cove is a small bight on the S shore about 1.5 miles above the East Bremerton Bridge. The cove is shoal; however, it has several private piers and a public launching ramp. A small-craft moorage is 250 yards E of Anderson Cove. Oil wharves are on both sides of the moorage.

Phinney Bay, 0.8 mile long, makes into the W shore near the N end of the narrows. Bremerton Yacht Club has its moorage with floats on the W side of the bay. **Rocky Point** is on the W side of the N entrance of the narrows. There are tide rips off this point.

Dyes Inlet extends about 3 miles NNW from the N end of the narrows to the village of **Silverdale** on the W side of the head of the inlet. The inlet is used by fishing boats and pleasure craft. There are several villages and many houses on its shores. The ruins of a large wharf are at Silverdale. Some local fishing boats are hauled out by crane for repairs, but there are no facilities. The village of **Tracyton** is on the E shore just N of the narrows. The village has a public boat launching ramp.

Chico is a small residential town on the SW side of Dyes Inlet, close W of Chico Bay; the log dump wharf here is in ruins.

Ostrich Bay is an inlet in the SW part of Dyes Inlet. A covered rock is reported in Ostrich Bay 500 yards S of **Elwood Point** inside the breakwater extending S of the point.

That part of the W shore of Ostrich Bay extending about 0.5 mile S from Elwood Point is an annex of the Puget Sound Naval Shipyard. The wharves and shops are no longer used and are in ruins.

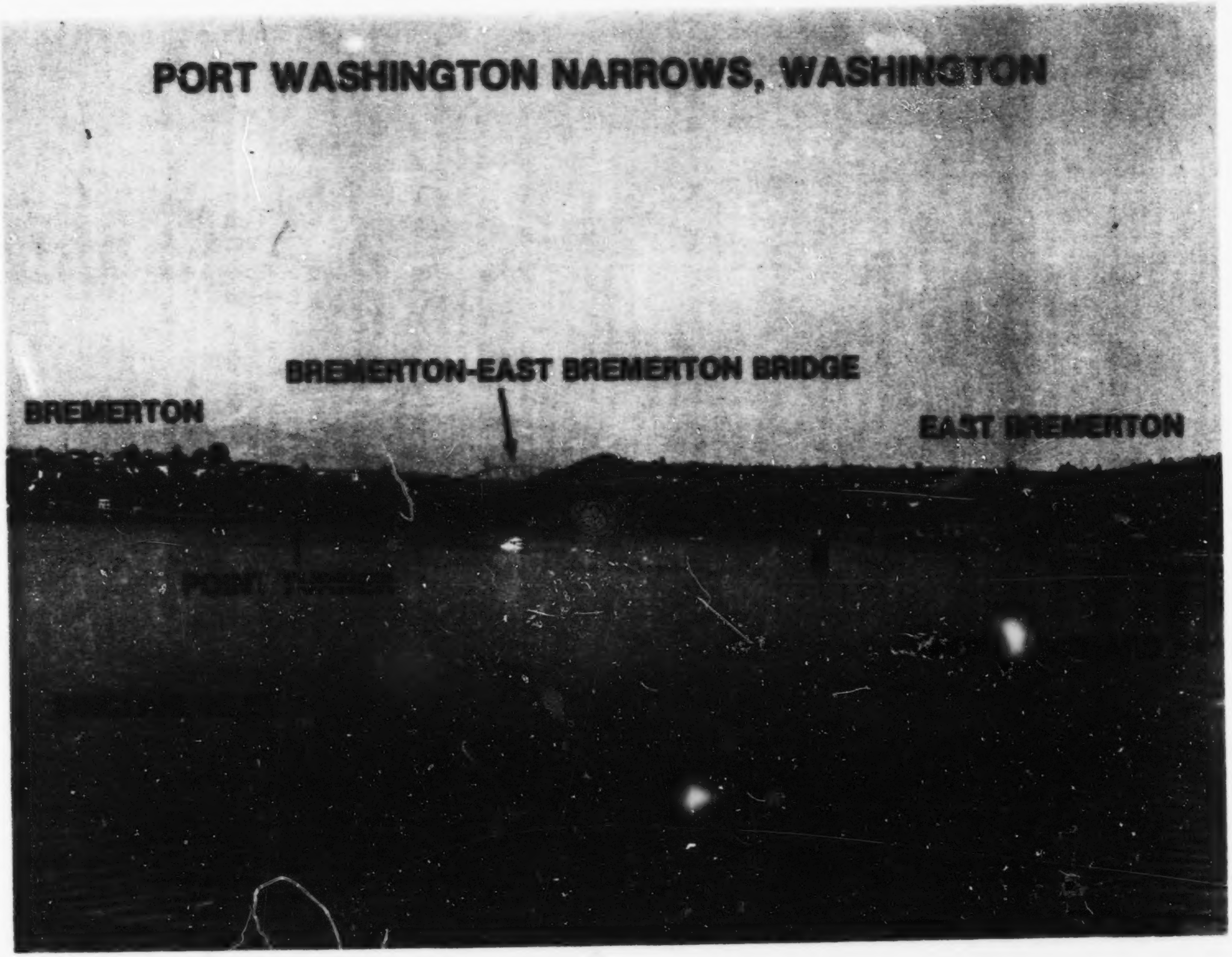
A depth of 6 feet can be carried from Ostrich Bay into **Oyster Bay** on midchannel courses. There is 4 feet or more in Oyster Bay.

Chart 18448, 18449.–East Passage, on the E side of Vashon and Maury Islands, extends from Alki Point SSE for 12.5 miles to Robinson Point, and thence SW for 6 miles to Browns Point. The waters throughout are deep and free from dangers, which in no case extend as much as 0.5 mile from shore.

Fauntleroy Cove, 3.5 miles S of Alki Point, is the site of the landing for the automobile ferry plying from there to Vashon Heights and Point Southworth.

A **general anchorage** is on the W side of the passage in the bight included between Orchard Point and Point Southworth and protected on the E side by Blake Island. (See 110.1 and 110.230 (a)(11), and (b), chapter 2, for limits and regulations.) Several settlements and resort villages are along the shores of Yukon Harbor; mostly fishermen and pleasure boaters use these waterfront facilities. Manchester has a short wharf with a float landing and a launching ramp. Two large wharves, one on the S side of **Middle Point** and the other on the S side of **Orchard Point,** are included in the oil storage area of the Puget Sound U.S. Naval Supply Center. **Harper,** a mile WNW of Point Southworth, is the site of a former ferry pier now in ruins. The ferry from Seattle, Fauntleroy, and Vashon Island docks at the slip on Point Southworth.

Blake Island, about 1 mile long, 249 feet high, and covered with trees, is off the N entrance to Colvos Passage. Heavy tide rips, strongest with a flood current, and strong S winds are encountered at the N entrance to Colvos Passage S of Blake



PORT WASHINGTON NARROWS, WASHINGTON

BREMERTON-EAST BREMERTON BRIDGE
BREMERTON
EAST BREMERTON

357

Island. Shallow, irregular bottom extends about 0.5 mile off the N shore of the island. A light is on the NE point of the island. Just S of the NE point of the island are the ruins of a wharf. A State marine park small-craft basin, protected by a breakwater, is at the NE end of the island. The entrance to the basin is marked by a private light and daybeacons.

A fish haven, marked by a private buoy, is on the reef about 260 yards off the S side of Blake Island.

Yukon Harbor, about 2 miles SW of Blake Island, affords anchorage in 30 to 50 feet, with protection from S winds.

Vashon Island is 11 miles long in a N direction. **Maury Island,** actually a peninsula of Vashon Island at its SE extremity, is connected to it by a highway on a narrow neck of land. Maury Island is about 5 miles long.

On these islands the land is of moderate rolling elevation and in places rugged, and most of the country is heavily wooded. The islands have numerous orchards and houses. There is some farming, and cattle and poultry are raised. The transmitting towers of Seattle broadcasting stations are on the islands; two groups of towers are on Vashon Island and two on Maury Island. The shores on all sides have numerous settlements. The county wharves, formerly used to ship farm produce, are no longer kept in repair, and shipments are now by truck.

Point Vashon, the NW tip of Vashon Island, is 305 feet high, steep, and wooded. Shoal water extends 0.2 mile N from the point and nearly as far along the N shore as **Dolphin Point,** 1 mile E. A light is 300 yards N of Point Vashon.

Vashon Heights Landing, 0.5 mile ESE of Point Vashon, has a combination ferry slip and landing wharf built out to 14 feet. An automobile ferry runs to Point Southworth and Fauntleroy.

The tall radio towers of station KOMO are on Point Beals. The town of **Vashon** is on high land 1.5 miles SW of Point Beals.

A **159°58′-339°58′ measured nautical mile** is E of Point Beals. The range markers are steel towers with round orange targets.

Three Tree Point (Point Pully), about 7.8 miles S of Alki Point, is a sharp low spit, projecting 300 yards from the high land which in 1 mile rises to an elevation of 430 feet. On the low part of the point is a grassy knoll, 30 feet high, with several trees on it. A light and fog signal are on the point.

Tramp Harbor, formed by the easternmost part of Vashon Island and the N end of Maury Island, has shoal water extending about 0.2 mile out from shore along its entire length. It is bounded on the N by **Point Heyer,** a sandspit behind which the ground rises rapidly. A shoal extends 0.2 mile SE from the point. A radio tower on this point is about 450 feet high.

Portage is a village extending over both sides of the low isthmus that connects Vashon and Maury Islands. Just N of the isthmus is an oil wharf and several storage tanks. Two radio towers about 526 feet high are 0.6 mile S of the isthmus, and three other radio towers are one mile SE of the isthmus.

There is a large small-craft marina at **Des Moines,** about 4 miles SE of Three Tree Point. A 2,200-foot rock breakwater, marked by a light at each end, offers shelter for over 700 craft in depths ranging from a reported 13 feet at the entrance to 10 feet at the S end. Electricity, gasoline, diesel fuel, water, ice, launching ramps, wet and dry storage, and marine supplies are available. Two 40-ton sling-type launchers are at the harbor, and a tidal grid is available for minor hull repair work.

Storm warning signals are displayed. (See chart.)

Robinson Point, the easternmost end of Maury Island and the major turning point in the passage, is a low spit projecting 140 yards from the wooded high land. **Robinson Point Light** (47°23.3′N., 122°22.4′W.), 40 feet above the water, is shown from a 38-foot white octagonal tower on the point; a fog signal is at the station.

There are two barge-loading berths at the gravel pits about 1 mile SW of Robinson Point. Conveyors load the barges. The gravel pits are prominent from the S end of East Passage. These facilities are the only commercial wharves on Vashon and Maury Islands, except for oil receiving wharves.

Redondo, on **Poverty Bay,** about 6.8 miles SSE of Three Tree Point, is a suburban village with small-craft facilities. A marina here has gasoline, covered storage, and a hoist is available for boats up to 20 feet. Engine repairs can be made. **Dumas Cove,** 2 miles W of Redondo, has several small wharves which bare at low water.

Quartermaster Harbor extends 5 miles NNE between the S parts of Vashon and Maury Islands, opposite Commencement Bay. Its shores are low and wooded, with numerous clearings, and several landings and private piers.

Quartermaster Harbor affords excellent anchorage about 2 miles inside the entrance in 5 to 10 fathoms, muddy bottom. The harbor is easy of access, and a midchannel course may be followed with safety.

A shoal just inside the entrance, between **Neill Point** and **Piner Point,** extends 300 yards from the E shore and is marked by a buoy. In an area just N of Neill Point, shoal spots extend 400 yards offshore, covered 2¼ to 2¾ fathoms. Depths of 4¼ fathoms are near midchannel W of **Manzanita,** and also near midchannel W of Dockton.

Many settlements and summer resorts are along the shores of the harbor, but the landing wharves, for the most part, are in disrepair.

Burton is a town on **Burton Peninsula** which projects E from the W side about 3 miles from the entrance. It has several stores and a marina. The marina has a pier with floats for a sizable number of pleasure craft; electricity, gasoline, water, and ice are available. A 4-ton hoist at the marina can handle craft to 32 feet for hull, engine or electronic repairs. Some marine supplies are available in the town. The Quartermaster Yacht Club has its moorage just N of the marina. There are several private mooring buoys in this part of the harbor.

An oil-receiving wharf and storage tanks are on the W side of the harbor about 0.7 mile N of Burton at the mouth of Judd Creek. The storage tanks are on the hill N of the harbor.

Dockton, in the bight on the E side about 2.5 miles from the entrance, is a village with a store. The County Park, on the E side of the bight, has a public pier and mooring float. There are several piers in ruins and pilings in the bight.

In the upper part of the harbor, N of the Burton Peninsula, are several private wharves and floats.

Colvos Passage, on the W side of Vashon Island, extends about 11 miles in a general S direction, with an average width of 1 mile. The passage is free of dangers. The N entrance is about 4.5 miles SW of Alki Point, and the S entrance is abreast Point Defiance. The passage is used principally by tugs hauling logs for the sawmills. A midchannel course can be followed with safety. The passage is marked by lights.

The current in Colvos Passage favors a N set, and at times advantage is taken of this fact by vessels bound from Tacoma to Seattle. The current in the middle of Dalco Passage and along the SW shore of Commencement Bay sets W or NW almost continuously.

To obtain full advantage of the peculiar currents in Colvos Passage and connecting waterways, use should be made of the Tidal Current Charts, Puget Sound, Southern Part.

Point Southworth, on the W side of the N entrance, is high and wooded. A ferry slip is 0.2 mile NW of the point. An automobile ferry runs to Fauntleroy and Vashon Heights.

Fragaria and **Olalla,** on the W shore of Colvos Passage, are small residential communities. Only isolated piling remain of their former wharves. A rock which bares at half tide is 400 yards N of the former wharf at Olalla. Olalla has a small-craft float landing and a general store. Gasoline, water, ice, and some marine supplies are available.

Cove and **Lisabeula,** on the E shore, are summer resort areas. There are no facilities at either area. The wharf at Cove is in ruins. Several pilings, formerly used as moorings for log rafts, are adjacent to the wharf. Lisabeula consists of a single waterfront resort with no facilities for small craft.

Tahlequah is a small residential community on the S shore of Vashon Island between Neill Point and Point Dalco. A ferry operates between Tahlequah and Tacoma. A marina with a 280-foot pier is just N of the ferry slip. Berths, gasoline, water, and ice are available.

Gig Harbor is an inlet about 1 mile long on the W side of the S entrance to Colvos Passage abreast Point Defiance. A light is on the S end of the sandspit, at the E side of the entrance, which makes out for 220 yards and constricts the entrance to less than 100 yards wide. A narrow 10-foot channel in the middle has currents of considerable velocity. Inside the entrance the basin has from 4 to 6 fathoms. The surrounding land, partially cleared of timber, slopes gently toward the shores and is thickly settled.

The town of **Gig Harbor** extends along the W shore and the head of the harbor. It is the home port of many pleasure craft and fishing boats. The town has two boatyards, each with marine railways. The larger of the two can handle craft to 150 tons for hull and engine repairs. The second boatyard is smaller and specializes in yacht construction and repair. A machine shop is in the town. There are many private piers and wharves, including three oil wharves. There are several marinas here. Berths, gasoline, diesel fuel, water, ice, launching ramps, and marine supplies are available in the harbor. Most of the pleasure craft moor at a large marina at the head of the harbor. A Coast Guard patrol vessel is stationed at Gig Harbor.

On entering Gig Harbor, hold midway between the spit on the E side and the W shore until just inside the entrance. Then swing right toward the E shore until past the short spit extending from the W shore, and steer a course just S of midchannel into the harbor.

Chart 18453.–Dash Point, the E entrance of Commencement Bay, and the village of **Dash Point** are a mile NE of Browns Point. There is a restaurant at the foot of the long pier which extends out from the N side of the point to a depth of 20 feet.

Point Defiance, the W entrance of Commencement Bay, terminates in a very prominent dirt bluff, 160 feet high. A light and fog signal are just W of the point. **Point Defiance Park** is wooded for a mile from the end of the point.

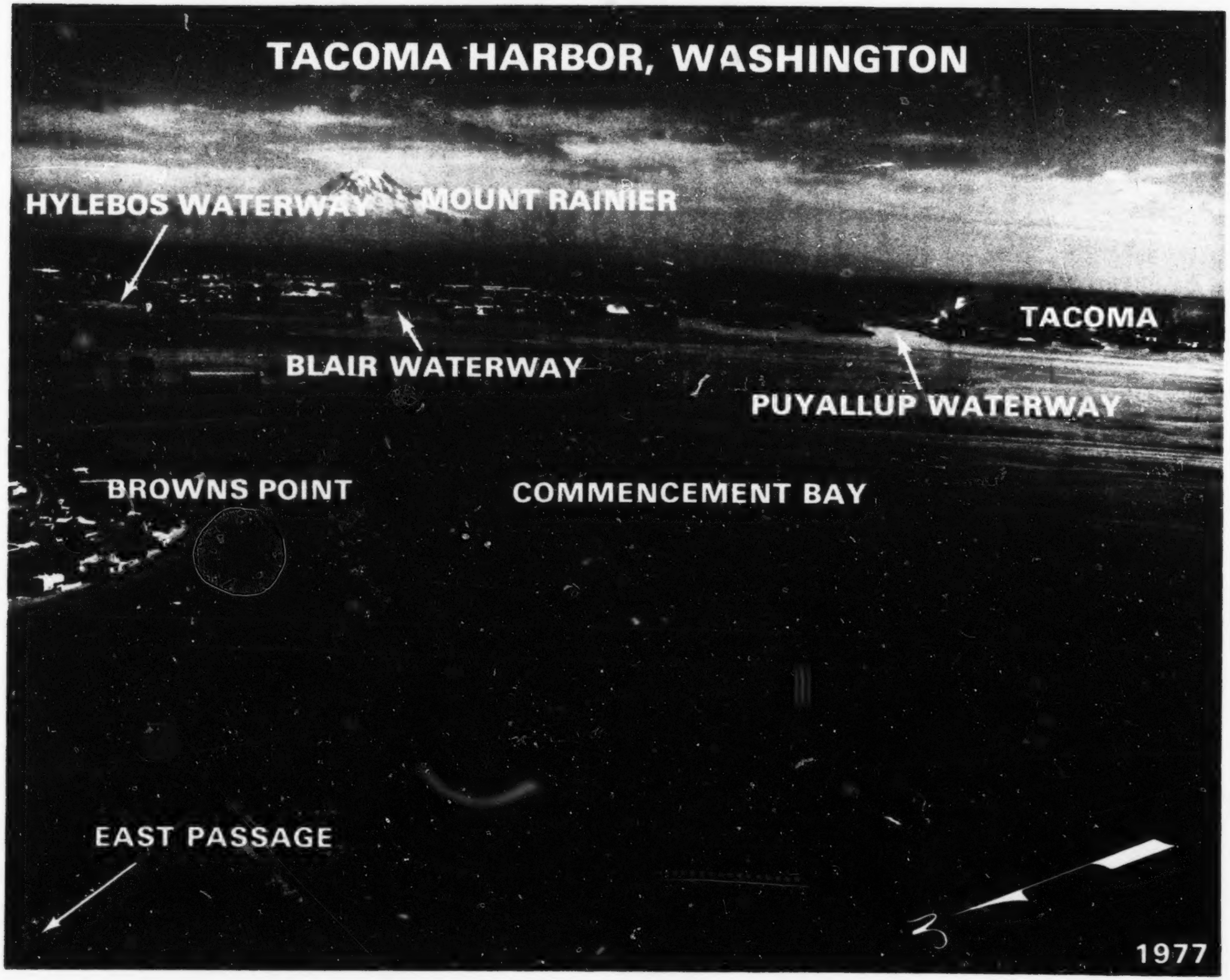
Storm warning signals are displayed. (See chart.)

Commencement Bay entrance lies 18 miles S of Alki Point and 56 miles S of Point Wilson. The bay is about 2.5 miles in length, easy of access, and free of dangers. Log storage grounds are off the NE shore of the bay.

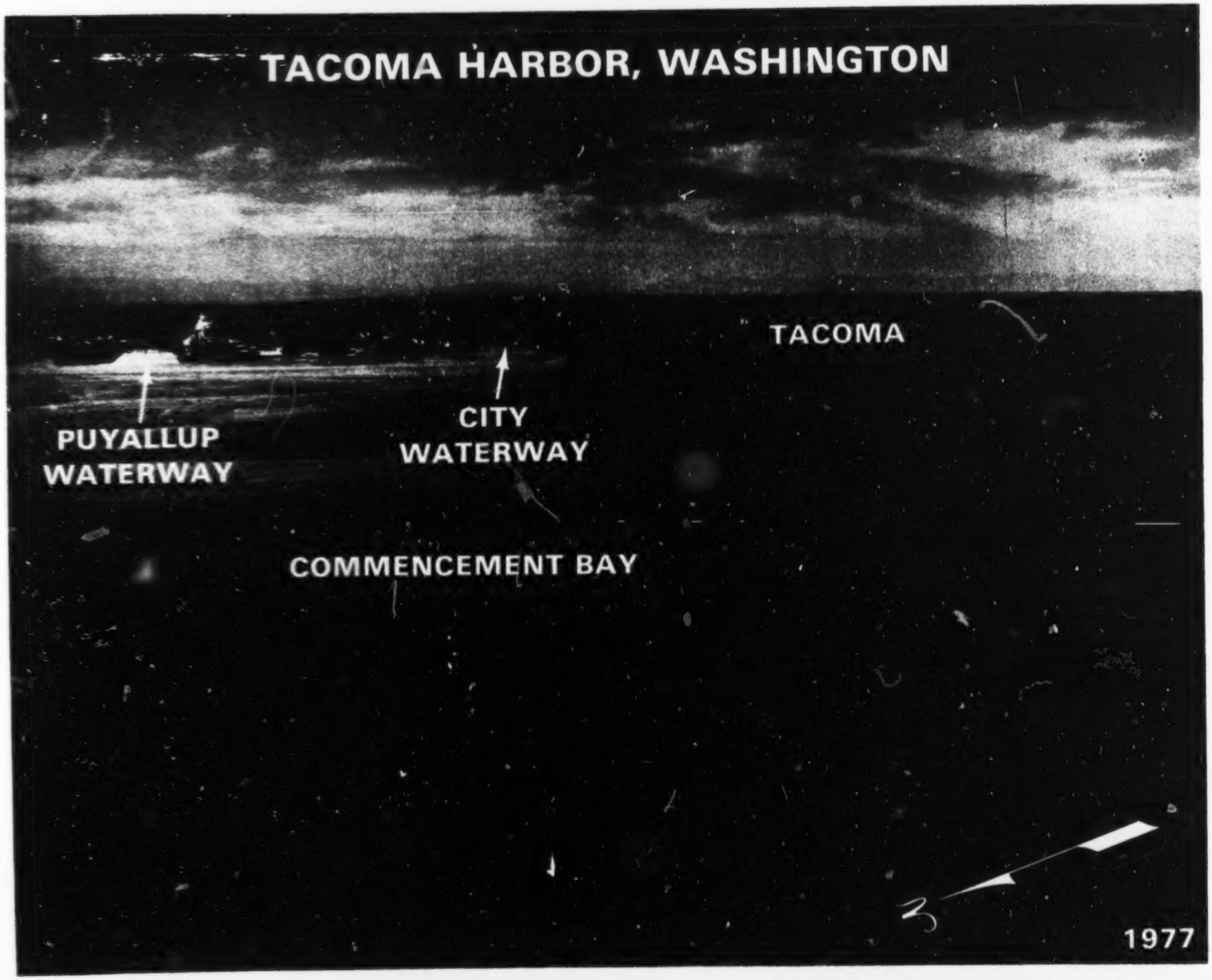
Tacoma, the second city in size and importance on the sound, occupies the S and SW shores of Commencement Bay, and its residential area has grown N into Seattle's S suburbs, and to Steilacoom on the SW.

The **Port of Tacoma** is a rapidly expanding major port, second only to Seattle in maritime importance on Puget Sound. Its exports include lumber and other wood products, grain, refined metals, machinery, general and containerized cargo; imports include alumina, and refined steel, electronic equipment, rubber, and meat. Much of the Alaska trade originates here.

Prominent features.–On entering Commencement Bay, either from the N via East Passage or Colvos Passage or from the S via The Narrows and Dalco Passage, Dash Point, Browns Point, and Point Defiance are prominent. **Browns Point Light** (47°18.4'N., 122°26.6'W.), 38 feet above the water, is shown from a 31-foot white tower on Browns Point; a fog signal is at the station. The huge stack of an ore smelter at Ruston, 2 miles SE of Point Defiance, is one of the most conspicuous landmarks



TACOMA HARBOR, WASHINGTON
HYLEBOS WATERWAY
MOUNT RAINIER
TACOMA
BLAIR WATERWAY
PUYALLUP WATERWAY
BROWNS POINT
COMMENCEMENT BAY
EAST PASSAGE
1977


TACOMA HARBOR, WASHINGTON
TACOMA
PUYALLUP
WATERWAY
CITY
WATERWAY
COMMENCEMENT BAY
1977

in the approach to Commencement Bay; numerous stacks, tanks and towers for the navigator to use are visible once inside the bay.

A **132°05′–312°05′ measured nautical mile** is off the W shore of the bay just SE of Ruston. The front markers are orange squares, and the rear markers are orange rectangles. A range formed by two stacks E of City Waterway is parallel to the measured mile course and may be steered when running over the course. A fish haven, covered 21 feet, is just N of the public pier about 0.6 mile SE of the S measured mile course markers.

From the NE corner of Commencement Bay, the city waterfront extends NW to within 1.5 miles of Point Defiance. Along here are numerous industrial plants with wharves to accommodate vessels drawing 30 feet or more.

City Waterway is the westernmost of the channels at the head of the bay. A light and fog signal are on the E side of the entrance. A Federal project provides for depths of 29 feet in City Waterway to the South 11th Street Bridge, thence 22 feet for 0.2 mile, thence 19 feet to the head of the project. Maintenance work is done when required on this waterway. The deep-draft loading wharves of a freight company and other private commercial facilities are along this waterway. Several oil docks and many oil storage tanks are on the E side.

There are two bridges over the waterway. The South 11th Street vertical lift bridge, 0.5 mile from the entrance to the waterway, has a clearance of 64 feet down and 139 feet up. The railroad swing bridge, 0.3 mile above the lift bridge, has a minimum clearance of 6 feet. (See 117.785, chapter 2, for drawbridge regulations and opening signals.)

Middle Waterway, NE of City Waterway, and **St. Paul Waterway,** NE of Middle Waterway, are not Federal projects. Between the two waterways is an old lumber wharf with deep water on all three sides, but the wharf is in poor condition and is not used. The inner parts of both waterways have shoaled and are not navigable. For about the outer 400 yards of each waterway, there are depths of 25 to 34 feet, but there is no deep-draft traffic. St. Paul Waterway is used for log storage by the large papermill which occupies the land on the NE side.

Puyallup Waterway, NE of St. Paul Waterway, discharges the water of **Puyallup River.** A light is on a jetty on the E side of the entrance. The waterway has shoaled to such an extent that it cannot be used commercially. The fixed highway bridge, 0.8 mile above the mouth, has a clearance of 29 feet.

Milwaukee Waterway, NE of Puyallup Waterway, has depths of 25 feet at the entrance and 30 feet or more inside, but is not a Federal project. A light and fog signal mark the shoal on the W side of the entrance. The railroads and a freight line have facilities here.

Sitcum Waterway, NE of Milwaukee Waterway, has depths of 32 to 45 feet; it is not a Federal project. The Port of Tacoma's Pier 7 is on the E side, and the Alaska Terminal is on the W side.

The next two channels to the NE of Sitcum Waterway, **Blair Waterway** and **Hylebos Waterway,** are maintained as Federal projects. A light is off the shoal on the N side of the entrance to Hylebos Waterway. The entrance to Blair Waterway is marked by a private light on the SW side and a private fog signal on the NE side. The project depth in Hylebos Waterway is 30 feet. Blair Waterway has depths of 30 feet in the SW half and 35 feet in the NE half of the channel to East 11th Street; thence to a lower turning basin extending to Lincoln Avenue, thence a channel to a turning basin at the head of the project, all 35 feet deep.

The 11th Street bascule bridges over the Blair and Hylebos Waterways have clearances, respectively, of 14 and 21 feet. (See 117.785, chapter 2, for drawbridge regulations and opening signals.) The bridgetenders can be contacted on VHF-FM channels 13 (156.65 MHz) and 16 (156.80 MHz). Call signs: KZN-573, Blair Bridge; and KZN-574, Hylebos Bridge. Power cables at both bridges have a clearance of 173 feet. A power cable across Blair Waterway just above Lincoln Avenue has a clearance of 170 feet.

(See Notice to Mariners and the latest editions of charts for controlling depths in the various waterways in Tacoma Harbor.)

Anchorage.–A **general anchorage** is off the N shore of Commencement Bay. (See 110.1 and 110.230 (a)(13), and (b), chapter 2, for limits and regulations.) The depths elsewhere in the bay, as a rule, are too great for convenient anchorage.

City regulations permit anchorage in any part of the bay outside the harbor lines so as not to interfere with vessels arriving or departing from their docks.

Tides and currents.–The mean range of tide at Tacoma is 8.1 feet, and the diurnal range of tide is 11.8 feet. A range of about 19 feet may occur at the time of maximum tides. The tidal currents in the harbor have little velocity.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Puget Sound from the Puget Sound Pilots or the Washington Pilots Association. (See **Pilotage,** chapter 12, for details.)

Towage.–Tugs up to 1,200 hp are available at Tacoma, and larger tugs may be obtained from Seattle. Arrangements should be made in advance through ships' agents.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Tacoma is a **customs port of entry.**

Coast Guard.–The Coast Guard maintains a **vessel documentation office** in Tacoma.

Harbor regulations are administered by the **harbormaster,** whose headquarters are at the fire station at 901 South Fawcett Street. The general offices of the Port of Tacoma are in the Tacoma Building at the corner of 11th and A Streets; the Port of Tacoma terminal offices are at Pier 2.

Speed.-A city ordinance prohibits speeds in excess of 5 knots on any of the waterways and within 200 yards of any shore or pier in the harbor.

Wharves.-The Port of Tacoma has more than 30 deep-draft piers and wharves located on Hylebos, Blair, Sitcum, Milwaukee, and City Waterways and along the S shore of Commencement Bay. The port-owned properties consist of the Port Industrial Yard, the 160-acre area between Blair and Hylebos Waterways NW of 11th Street, and its deep-draft piers; the 3,000-acre Port Industrial Development District, which includes the entire waterfronts of Blair and Hylebos Waterways above 11th Street; and the Marine Terminal facilities between Blair and Sitcum Waterways below 11th Street. The terminal facilities include some 28 deepwater berths ranging in depth from 30 to 50 feet. In addition to the port-owned properties, the harbor has numerous privately owned piers and wharves and many barge facilities.

Only the major deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 35, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths are reported. (For information on the latest depths contact the Port of Tacoma general office or the individual operators.) All the facilities described have direct highway connections, and most have plant trackage with railroad connections. Water is available at about 75 percent of the wharves, but electrical shore power connections are available at only about 40 percent of the wharves. General cargo is usually handled by ships' tackle. Special handling equipment, if available, is mentioned in the description of the particular facility. The Port of Tacoma operates its own belt line railroad with switching connections to three major railroads.

Port of Tacoma facilities:

Facilities on Hylebos Waterway:

Pier 23: immediately SW of Pier 24 between Hylebos and Blair Waterways; two 1,155-foot berths on each side; 28 to 34 feet alongside; deck heights, 18 feet; Berth C, the NW berth, receipt of logs and general cargo; Berths A, B, and D, used for mooring tugs and vessels awaiting salvage; operated by Port of Tacoma and U.S. Army Reserve.

Pier 24 (47°17'02"N., 122°24'35"W.): 500-foot usable berthing space each side; 27 to 34 feet alongside; deck heights, 18 feet; two 35-ton gantry cranes serve the pier; receipt of pipe, shipment of logs, and mooring vessels for repair; operated by the Port of Tacoma.

Facilities on Blair Waterway:

Pier 5 (47°16'33"N., 122°24'56"W.): 570-foot berthing space; 35 feet alongside; deck height, 22 feet; 25-million-gallon bulk liquid facility for transfer of tallow, edible and nonedible oils, chemicals, and other liquids to vessel in heated, liquid state, also used as a lay berth by vessels awaiting berthage at the grain wharf; operated by Fore Terminal Co.

Pier 1 (47°16'36"N., 122°24'51"W.): W side, 712-foot berthing space with dolphins, 47 feet alongside, deck height, 22 feet; Berth C, N side, 320-foot berthing space, 35 feet alongside, deck height, 18 feet; Berths A and B, E side, 1,200-foot berthing space, 35 feet alongside, deck height, 18 feet; W side is served by grain gallery with seven loading spouts, any two spouts have a rate of 33,000 bushels per hour, gallery connected to 4½-million-bushel grain elevator; 31,600 square feet covered storage, 60,000 square feet paved, open storage; receipt and shipment of general cargo, shipment of grain and bulk liquids; operated by Port of Tacoma and Fore Terminal Inc., grain wharf and elevator operated by United Grain Corp.

Pier 2 (47°16'31"N., 122°24'42"W.): W side, 1,200-foot berthing space, N face, 450-foot berthing space; 35 feet alongside all berths; deck heights, 22 feet; 256,000 square feet covered storage plus 2-million-cubic-foot cold storage plant with quick-freeze tunnel, quick-freeze rooms, 50,000-box-capacity cooler space at ship's side, meat defrosting and inspection facilities; frozen meat is unloaded through the transit shed to the cold storage plant; receipt and shipment of general cargo; operated by the Port of Tacoma.

Container Terminal 4 (47°16'22"N., 122°24'18"W.): W side of Blair Waterway just below East 11th Street Bridge; 1,300-foot berthing space, 45 feet alongside, deck height, 18 feet; 150,000 square feet covered storage, 23 acres paved, open storage; two 50-ton straight-line cranes; rail service with 10-car capacity; receipt and shipment of general and containerized cargo; operated by the Port of Tacoma.

Blair Waterway Terminal: W side of Blair Waterway, 1.8 miles above the entrance to the waterway; 1,200-foot berthing space, 40 to 45 feet alongside, deck height, 22 feet; 200,000 square feet covered storage area, 32 acres open log storage and sorting area; one 45-ton whirley crane, receipt of general cargo, shipment of logs; operated by Port of Tacoma.

Pierce County Terminal: S end of the upper turning basin on Blair Waterway; 1,400-foot berthing space, 45 feet alongside, deck height, 22 feet; 190,000 square feet covered storage, 128 acres paved, open storage area; receipt and shipment of general cargo; operated by the Port of Tacoma.

Facilities on Sitcum Waterway:

Pier 7 (47°16'06"N., 122°24'48"W.): 2,700-foot berthing space; 35 feet alongside two inner berths, A and B, 45 feet alongside berth C and 50 feet alongside outer berth, Berth D; deck heights, 18 feet; 102,000 square feet covered storage, three 41-ton whirley cranes, one bulk-loading crane, rate 750 to 1,500 tons per hour, two 50-ton container cranes, alumina loadout facility which transports alumina ore to one of two storage domes, capacities of 50,000 and 100,000 tons, serves Berth C; receipt of dry bulk alumina ore, receipt and shipment of general and containerized cargo; operated by Port of Tacoma.

Alaska Terminal: SW side of Sitcum Waterway; three 130-foot roll on/roll off ramps; 40 to 45 feet alongside; deck height, 19 feet; 25 acres open storage; receipt and shipment of containerized and roll on/roll off cargo.

Facilities on SW side of Commencement Bay:

Continental Grain Wharf (47°15'59"N., 122°26'30"W.): 450-foot berthing space; 70 feet alongside; 3-million bushel grain elevator; loading rate 2,000 tons per hour; receipt and shipment of grain; operated by Continental Grain Co.

Private facilities:

Facilities on Hylebos Waterway:

Hooker Chemical Wharves 1 and 2 (47°16'49"N., 122°24'08"W.): 940-foot usable berthing space with dolphins, 30 to 31 feet alongside; deck heights, 19 feet; pipelines extend from wharves to storage tanks; at wharf 1, a hopper for receiving bulk salt serves a conveyor system extending to storage area of 70,000-ton capacity, unloading rate 900 tons per hour; receipt of fuel oil for plant consumption and bulk salt, shipment of industrial chemicals in bulk and containers and shipment of waste products; owned and operated by Hooker Chemical Corp.

Fletcher Oil Wharf; W side 500 yards NW of 11th Street Bridge; 120-foot berthing space, 31 feet alongside, deck height, 18 feet; receipt and shipment of petroleum products; owned and operated by Fletcher Oil Co.

Naval Reserve Wharf; W side 300 yards NW of 11th Street Bridge; 630-foot berthing space, 30 feet alongside, deck height, 12 to 18 feet; mooring Naval vessels; owned and operated by U.S. Navy.

Sound Refining Dock (47°16'33"N., 122°23'03"W.): 570-foot berthing space, 30 feet alongside, deck height, 19 feet; receipt and shipment of petroleum products; owned and operated by Sound Refining Inc.

Pennwalt Chemical Wharf (47°16'09"N., 122°22'24"W.): 585-foot berthing space with dolphins, 30 feet alongside, deck height, 18 feet; conveyors extend from wharf to a salt storage tank and open storage area, unloading rate 1,000 tons of dry bulk salt per hour; rail tracks on wharf enable unloading salt by ship's tackle and by clamshell buckets to hoppers on railroad cars; receipt of bulk salt, raw materials, and fuel oil for plant consumption, and shipment of caustic soda; owned and operated by Pennwalt Chemical Corp.

General Metals Wharf (47°16'05"N., 122°22'09"W.): 1,155-foot berthing space with dolphins, 15 to 30 feet alongside, one 40-ton and one 50-ton gantry crane; receipt and shipment of scrap metal; owned and operated by General Metals of Tacoma Inc. Note: the company prefers vessels to moor starboardside-to.

Weyerhaeuser Log Wharf: SW side of upper turning basin on Hylebos Waterway; 1,100-foot berthing space with dolphins, 39 feet alongside deck height, 19 feet; 18 acres open log storage and sorting yard; seven log stackers; shipment of logs; owned and operated by Weyerhaeuser Co.

Buckeye Pipeline Co. Wharf (47°15'16"N., 122°21'42"W.): 200-foot berthing space with dolphins, 35 feet alongside, deck height, 16 feet; receipt of petroleum products; owned and operated by Buckeye Pipeline Co.

Facilities on Blair Waterway:

Domtar Chemical Wharf (47°16'12"N., 122°23'48"W.): 420-foot berthing space with dolphins, 32 feet alongside, deck height, 20 feet; one crawler crane with clamshell bucket which unloads into a hopper serving a conveyor, which extends to stockpile and plant in rear, unloading rate 300 tons per hour; receipt of limestone, shipment of quicklime by barge; owned and operated by Domtar Chemicals Inc.

U.S. Oil and Refining Co. Dock 1 (47°16'01"N., 122°23'47"W.): 645-foot berthing space with dolphins, 42 feet alongside, deck height, 18 feet; receipt and shipment of petroleum products; owned and operated by U.S. Oil and Refining Co.

Weyerhaeuser Co., Puget Sound Chip Center Wharf (47°16'47"N., 122°23'06"W.): 805-foot berthing space with dolphins, 40 feet alongside, deck height, 20 feet; served by two 375-foot chip conveyor belts with a loading rate of 1,000 tons per hour; 15 acres paved open chip storage; shipment of wood chips; owned and operated by Weyerhaeuser Co.

Facilities on Milwaukee Waterway:

Milwaukee Ocean Dock 1 (47°16'10"N., 122°25'22"W.): just NW of Milwaukee Ocean Dock 2; 1,150-foot berthing space, 32 to 34 feet alongside, deck height, 22 feet; 87,700 square feet covered storage; receipt and shipment of general cargo; owned by Chicago, Milwaukee, St. Paul and Pacific Railroad Co.; operated by Puget Sound Freight Lines.

Milwaukee Ocean Dock 2 (47°15'52"N., 122°25'04"W.): 1,020-foot berthing space, 32 to 34 feet alongside, deck height, 22 feet; 51,300 square feet covered storage; pipelines connect wharf to a large storage tank; receipt of petroleum products for railroad use and general cargo; owned by Chicago, Milwaukee, St. Paul and Pacific Railroad Co.; operated by Puget Sound Freight Lines.

Note: Shoal water extends nearly 0.2 mile off the entrance to Milwaukee Waterway on either side of the channel. In addition, it is reported that currents can be expected setting to the E across the channel entrance on the ebb tide or during freshets in the Puyallup River.

Facilities on City Waterway:

Northwestern Petroleum Wharf (47°15'39"N., 122°26'05"W.): 570-foot berthing space with dolphins, 26 feet alongside, deck height, 20 feet; receipt of petroleum products, fueling of small craft; owned by Puget Sound Plywood Inc.; operated by Northwestern Petroleum Inc.

Pacific Storage Wharf (47°15'07"N., 122°26'00"W.): 450-foot berthing space, 40 feet alongside, deck height, 18 feet; 57,000 square feet covered storage; general cargo; owned by Burlington Northern Inc.; operated by Pacific Storage Co.

Puget Sound Terminals Wharf (47°15'29"N., 122°26′08″W.): 420-foot berthing space, 27 feet alongside, deck height, 18 feet; 30,000 square feet covered storage; receipt and shipment of general cargo; owned by Puget Sound Freight Lines; operated by Puget Sound Terminals.

Union Oil Wharf, Tacoma Marine Terminal Dock (47°15′31″N., 122°25′59″W.): 150-foot berthing space with dolphins, 30 feet alongside, deck height, 26 feet; receipt of petroleum products; owned and operated by Union Oil Co. of California.

Facilities on SW side Commencement Bay:

Tacoma Smelter Ore Dock (47°17′58″N., 122°30′05″W.): 598-foot berthing space, 33 to 37 feet alongside, deck height, 25 feet; two 8-ton traveling gantry cranes; 5-ton capacity clamshell buckets operate from trolley; one 30-ton locomotive crane serves the ore wharf and nearby copper wharf; cranes unload to hopper-conveyor system which serves smelter in rear; receipt of ore and concentrates; owned and operated by American Smelting and Refining Co.

Tacoma Smelter Copper Dock (47°18′04″N., 122°30′11″W.): 550-foot berthing space, 33 to 36 feet alongside, deck height, 25 feet; 30-ton locomotive crane serves ore and copper wharves; receipt of petroleum products; shipment of smelter products; owned and operated by American Smelting and Refining Co.

Supplies.–Most marine supplies and services are available at Tacoma. Bunker fuel, diesel oil, and lubricants are available. Gasoline and diesel fuel are available at the oil docks on City Waterway. Large vessels are bunkered at their berths by barge. Water is available at most of the berths.

Repairs.–There are no facilities for major repairs to large oceangoing vessels in Tacoma; the nearest such facilities are in Seattle, Wash. The largest floating drydock in Tacoma is at a boatbuilding company on the NE side of Blair Waterway, just SE of the E 11th Street Bridge; it will handle vessels to 1,265 tons or 200 feet. The firm has a complete machine shop. The largest marine railway in Tacoma is on the wharf about 300 yards SE of the SE measured-mile marker on the W side of the bay. The yard has several cranes, the largest of which has a capacity of 100 tons; the railway here is certified for 1,500 tons.

Small-craft facilities.–A public pier, owned by the city of Tacoma, is 0.6 mile SE of the S marker of the measured mile course on the SW side of Commencement Bay; small craft moor here temporarily. There are numerous other small-craft facilities on Hylebos, Blair, and City Waterways, and on the SW shore of Commencement Bay. (See the small-craft facilities tabulation on chart 18445 for services and supplies available.)

Communications.–Tacoma is served by three major railroads, Seattle-Tacoma Airport, and Tacoma Industrial Airport. Tacoma is on Interstate Highway 5, which extends from Vancouver, B.C., to San Diego, Calif.

Chart 18448.–S of Point Defiance are numerous inlets, passages, and islands. At many of the villages the landing wharves have fallen into ruins, all transportation following the highways. These waters are navigated by log tows and by pleasure craft. Deep-draft vessels call at Olympia for lumber and other forest products. The depths are generally great, and the dangers are few. The shores are well wooded and moderately low. The beaches are sand and gravel, with boulders in places, and are often backed by steep, bare sand and gravel bluffs. Olympia and Shelton are the only cities, but there are many smaller settlements. Strangers bound through these waters at night are advised to take a pilot.

Currents.–In The Narrows current velocities exceed 5 knots at times. At the N end of The Narrows the current sets N most of the time on the E side of the passage and S most of the time on the W side. (See Tidal Current Tables for daily current predictions for a midstream position near the N end of The Narrows and details of the current movement at other locations; these tables and the Tidal Current Charts, Puget Sound, Southern Part, should both be consulted for details of the complicated currents of this area.)

From Point Defiance to near Days Island, the E shore of **The Narrows** consists of high, bold bluffs. A tunnel is 1.7 miles SE of Point Defiance; from it a railroad track follows the shoreline to Nisqually River. The W shore is broken by inlets and passages which afford communication to small settlements devoted to lumbering or agriculture.

Point Evans, 2 miles S of Point Defiance on the W side of The Narrows, is marked by a light. Power cables with a clearance of 200 feet cross 200 yards S of the point. **Tacoma Narrows Bridge,** a highway suspension bridge, crosses The Narrows a mile S of Point Evans. The clearance is 159 feet at the piers and 180 feet at the center. A private fog signal marks each of the two piers.

Days Island is about 4.5 miles S of Point Defiance. The ferry slip and wharf here are in ruins. There are three marinas here, one on the E side of Days Island and two in the cove 150 yards E of the N end of the island. A total of about 200 berths are at the marinas; electricity, gasoline, diesel fuel, water, ice, dry storage for over 500 craft, and marine supplies are available. A 15-ton crane and hoists to 3 tons are available to handle craft for hull and engine repairs. A 2¾-fathom shoal is 230 yards W of the former ferry slip.

A small-boat channel, 1 foot deep, leads into **Days Island Lagoon.** The channel favors the Days Island side and under the bridge is 30 yards from the island shore. Local boats anchor in 3 feet in the lagoon. The floats of a private yacht club are on the S and W sides of the lagoon. Anchorage for small-craft may be had E of the N end of Days Island.

Three miles S of Days Island, the shores consist of bare bluffs which are prominent from S.

From here the route to Olympia continues SW and W through **Balch Passage,** Drayton Passage, and Dana Passage, thence S into Budd Inlet. This route is deep and generally free of dangers.

Caution.–The channel through Balch Passage is only about 100 yards wide between the 10-fathom curves, and the scale of the chart is small. Vessels should stay carefully in midchannel, traffic permitting.

Hale Passage, between **Fox Island** and the mainland, enters on the W shore 5 miles S of Point Defiance. It is 4 miles to its junction with Carr Inlet. Near the W end the passage is crossed by a fixed highway bridge with a clearance of 31 feet. A shoal, marked on its NE side by a buoy, is 350 yards SE of the bridge and near the middle of the passage; the shoal is boulder-strewn and bares. The channel is on the NE side of the buoy. A good small-craft anchorage is on either side of Tanglewood Island. The current in Hale Passage attains a velocity in excess of 3 knots at times. The E (ebb) current is stronger than the W (flood) current. (See Tidal Current Tables for current predictions.)

Fox Island is a village in the small cove near the NE end of Fox Island. It has a store and service station. **Tanglewood Island,** in the center of the cove, has a boys' camp, the buildings of which are prominent. A structure resembling a lighthouse is on the extreme N end of the island.

Wollochet Bay is a small inlet about 2 miles long extending N from Hale Passage, about 1 mile inside the E entrance. The upper part is narrow and shoal. It affords an anchorage in midchannel about 0.3 mile inside the entrance in 11 to 12 fathoms, sticky bottom. There are many private piers and mooring buoys in the bay.

Gibson Point, the S tip of Fox Island and the N entrance point of Carr Inlet, is marked by a light. **Toliva Shoal,** nearly in midchannel 0.9 mile S of Gibson Point, consists of two rocks covered 1¾ fathoms and is marked by a lighted bell buoy. The shoal may be passed on either side, giving the buoy a berth of more than 500 yards.

Carr Inlet enters the W shore of the sound about 7½ miles SSW of Point Defiance. From the entrance, between Fox and McNeil Islands, it extends about 6 miles NW and then trends NNE for 8 miles terminating in flats at the head. Good anchorage is available in the upper reaches in 6 to 15 fathoms, soft bottom, and in several small coves on its S and E shores. From the entrance, a midchannel course is safe.

A **naval restricted area** is in the S part of Carr Inlet. (See 207.750 (n), chapter 2, for limits and regulations.)

A **298°23'—118°23' measured nautical mile** has been established on the NE shore of McNeil Island. Range markers, consisting of white diamond daymarks with red vertical stripes, mark the ends of the measured course.

The Washington State penitentiary, on the SE side of **McNeil Island** about 0.8 mile SW of **Hyde Point,** is prominent when approaching. The wharf, built out to 16 feet, is lighted by a row of lights. Water is piped to the end of the wharf.

Gertrude is a village on the S side of Carr Inlet on the shore of **Still Harbor,** which is a bight on the N side of McNeil Island S of **Gertrude Island.** It has a landing in 10 feet of water. Depths in the middle of the harbor are 6¾ to 10 fathoms, sand and mud bottom. The bottom slopes gradually to a flat of sand and gravel at the head of the bay E of the wharf at Gertrude.

Wyckoff Shoal, part of which bares, extends 0.8 mile NW from the NW part of McNeil Island. A buoy on the NW edge of the shoal marks the E side of the channel leading into Pitt Passage.

Pitt Passage, between Key Peninsula and McNeil Island, connects Drayton Passage and Carr Inlet. It is obstructed about midway of its length by **Pitt Island** and its surrounding rocks and shoals. Only the passage E of Pitt Island is used by small craft with local knowledge. In this passage the ebb (N current) is stronger than the flood and attains a velocity of 2.5 knots or more at times.

Lakebay, at the head of **Mayo Cove** on the SW shore of Carr Inlet, is a village with a store and several small private piers. A marina here has a long pier and floats with berthage for about 35 craft; electricity, gasoline, water, and ice are available. About 7 feet can be carried to the marina pier, but the channel to the pier is difficult to navigate; strangers are advised to proceed cautiously and obtain local advice. On the E side of Mayo Cove, along **Penrose Point,** a State park has a small float with moorage for about 10 small craft. Water is available at the State park.

Home, a village on the W side of **Von Geldern Cove,** has a store and service station. A bridge crosses the cove at its head. A shoal extends from the N shore at the entrance to the cove.

Glencove is a small settlement in Glen Cove on the W side of Carr Inlet, about 5 miles N of South Head. It is a summer recreational area with a private wharf and float. A small marina here has berths and gasoline. There is a small-craft launching ramp near the marina.

Wauna is a village at the head of Carr Inlet, where the spit enclosing **Burley Lagoon** joins the mainland. A county road extends along the spit and across the entrance to the lagoon over a fixed highway bridge to Rosedale and Gig Harbor. The bridge has a clearance of 12 feet (23 feet at center).

Rosedale is a residential community on the cove on the E side of Carr Inlet and 180-foot-high **Raft Island.** There is an extensive shoal area around and between Raft Island and **Cutts Island.** The shores of these islands are strewn with boulders. A fixed highway bridge and overhead cable extend from the S side of Raft Island to the mainland. The bridge clearance is 17 feet, and the cable, 48 feet.

Horsehead Bay, about 1 mile long, is directly N of Green Point, at the W extremity of Hale Passage. This is a residential area with several private wharves.

On the S side of McNeil Island, there is a ferry landing at **Bee,** a facility of the Federal penitentiary 1 mile E. The ferry connects with Steilacoom, Ketron Island, and **Anderson Island.**

Eagle Island, small and wooded, is near the middle of Balch Passage, 0.2 mile from Anderson Island, and is marked on its N end by a light. Eagle Island is a State park. On the shores of Anderson Island, S of Eagle Island, are private float landings.

Eagle Island Reef, 300 yards W of Eagle Island, bares 1 foot at its S part and has a depth of 3 feet at its N part. A lighted buoy is off the NW part of the reef.

Drayton Passage, between Key Peninsula and Anderson Island, is about 3 miles long in a N direction; at its N end, it connects with Pitt Passage and Balch Passage, and at its S end joins the W part of Nisqually Reach. With the exception of a spit extending 0.2 mile from the W shore, marked by a light, the waters are deep and free of dangers. Estimated current velocities of 1 to 2 knots occur at the SW end of the passage.

Filucy Bay, on the W shore opposite Balch Passage, is about 1.5 miles long and irregular in shape; it is 0.4 mile wide at the entrance. Good anchorage in 7 to 8 fathoms, muddy bottom, is available. There are numerous houses around the shores of this bay. **Longbranch,** a village in the small cove opposite the entrance, has a general store and a service station. A pier and floats for about 30 fishing and pleasure craft are here. Ice, water, and limited marine supplies are available.

Steilacoom is on the mainland about 9 miles SSW of Point Defiance. The town is of little commercial importance and has no waterfront facilities except for the ferry terminal which maintains service to Anderson, Ketron, and McNeil Islands. Limited berthage for small craft, gasoline, water, ice, and a hoist are available at the terminal. Limited engine repairs can be made. Indifferent anchorage may be had along the waterfront close inshore, but it is not recommended as the holding ground is poor and the currents have considerable velocity. Off Steilacoom there are tide rips which, with a wind opposing the current, are dangerous to small boats.

There are two large, conspicuous sand and gravel pits on the bluffs about 1.5 miles NNE of Steilacoom. Both have T-piers served by conveyor belts from the gravel pits. The N pier is 569 feet long, has 25 feet reported alongside, and has a deck height of 14 feet. The S pier is 426 feet long, and has 20 feet reported alongside and a deck height of 20 feet. Both are used for the shipment of sand and gravel by barge.

Ketron Island, 10 miles SSW of Point Defiance and E of Anderson Island, is a small, narrow island which is privately owned. It is heavily wooded with bluff shores. **Cormorant Passage,** 0.5 mile wide, separates the island from the mainland S. The passage is clear, but is little used.

Nisqually Reach trends S and W around Anderson Island to Case Inlet. **Nisqually Flats,** formed by **Nisqually River,** bare at low water, occupying the S shore of the reach for nearly 1 mile offshore, is a fish and game refuge and used for commercial aquaculture. The flats are very soft mud and the edge is steep-to with deep water, sand bottom, close-to. The boat ramp at Nisqually Head is accessible only at high water. Lighted buoys mark the N edge of the flats and a light marks the S tip of Anderson Island at Lyle Point. **Thompson Cove,** on the W side of the point, is a cable area and should not be used as an anchorage.

Oro Bay, in the SE part of Anderson Island, is an irregular bight between **Cole Point** and **Lyle Point.** Most of the bay is shallow; it affords an indifferent anchorage in about 10 fathoms, but is affected by the currents and affords little protection. A small shallow arm extends about 1 mile NW on the W side of the bay. An anchorage for small craft is here.

A wharf, built out from the mouth of **Sequalitchew Creek,** 13 miles SSW of Point Defiance, is 340 feet long, has 27 feet reported alongside, and a deck height of 19 feet. A powder plant wharf, currently unused, is about 1.5 miles NW of **Nisqually Head;** there is a depth of about 24 feet alongside.

Devils Head, the S point of Key Peninsula, is 280 feet high and heavily wooded. A light is shown off the S tip of Devils Head.

Johnson Point, 2 miles W of Devils Head, is 90 feet high. A light and fog signal are on the sandspit at the end of the point.

There are two marinas on the W shore of Nisqually Reach, one 0.8 mile and one 1.9 miles SSE of Johnson Point. Gasoline, water, ice, and some marine supplies are available at each marina. The N marina has diesel fuel and a 5-ton hoist. The S marina has a 25-ton lift that can handle craft up to 20 feet long. Both marinas can make hull and engine repairs. Depths of 8 feet are off the floats at the N marina, but those at the S marina go dry at low tide.

Local magnetic disturbance.–Differences of as much as 3° from normal variation have been observed along Henderson Inlet.

Itsami Ledge, covered 1 fathom, lies 1 mile WSW of Johnson Point. It is surrounded by kelp and marked by a light. This is a danger in entering Henderson Inlet or Dana Passage.

Henderson Inlet, locally known as **South Bay,** immediately W of Johnson Point, extends about 4.5 miles in a S direction; the S part is an extensive flat. Good anchorage is inside the entrance in 5 to 6 fathoms, muddy bottom. A spit makes out about 0.2 mile N from the W point at the entrance; on the W shore, 0.8 mile S of the entrance point, is a long sandspit. There is a railroad log dump with booming grounds on the W side. Oyster beds abound in the S area of the bay.

Case Inlet, a popular sport fishing and resort area, extends some 14 miles N from Johnson Point. The flats at its head are only 2 miles from the head of Hood Canal. Depths are irregular, from 10 to 30 fathoms, but there are no off-lying dangers.

Hartstene Island forms the W side of the S part of the inlet. A marina in Jarrell Cove at the N end of the island has berths, gasoline, water, ice, and some groceries. The pier here has 10 feet reported alongside. The 200-foot Jarrell Cove State Park pier is directly across the cove from the marina. A State park float is farther up the cove.

Herron Island, about 4 miles N of the entrance and 0.3 mile W of the E side, is a popular summer resort, with moorings for small craft. A ferry connects with the mainland at the village of **Herron.** The bar between the N end of Herron Island and the E shore has a least depth of about 13 feet, but with local knowledge a depth of 21 feet can be carried through by rounding the NE tip of Herron Island some 300 to 500 yards off.

Pickering Passage indents the W shore of Case Inlet, about 2 miles N of Herron Island. The passage extends in a general S direction for 8 miles, connecting at its S end with Peale Passage and Totten Inlet. The shores are generally low and wooded, and the depths vary from 4½ to 15 fathoms. Except for the shoals extending E from the mouth of Hammersley Inlet, the passage is free of outlying dangers, and a midchannel course is safe. In Pickering Passage the flood current sets from Case Inlet toward Hammersley Inlet and the ebb in the opposite direction. The strongest currents are near the S end where velocities reach 2.5 knots at times. The settlements are served by highway. A fixed highway bridge with a clearance of 31 feet crosses the passage from Graham Point to Hartstene Island, about 2.6 miles N of the entrance to Hammersley Inlet.

Stretch Island is near the W shore of Case Inlet, just N of the entrance to Pickering Passage. There is no through channel W of this island. The N part of this island is partly cleared of trees and laid out in orchards; a winery and several grape juice factories, no longer operating, are here. There is a private landing wharf built out to 12 feet on the N end of the island. A fixed highway bridge with a clearance of 14 feet connects the mainland. **Grapeview** is a village opposite Stretch Island.

Reach Island, 0.2 mile N of Stretch Island, has been subdivided for homesites and is known as **Treasure Island.** It is separated from the W shore by a shallow channel known locally as **Fair Harbor.** The channel is spanned by a fixed bridge with a clearance of 16 feet. A rock that bares 5 feet is near the middle of the passage back of Reach Island. The through channel is W of the rock and has a controlling depth of 1 foot. To avoid the rock, favor the W shore. There is a marina on the mainland 0.3 mile S of the bridge. About 20 berths, gasoline, diesel fuel in cans, water, ice, and a launching ramp are available.

Vaughn is a village on the N shore of **Vaughn Bay,** which lies on the E side of Case Inlet about 4 miles from the head. There is a public launching ramp here. The combined civic center for all the small towns on the entire peninsula is at Vaughn. A channel 1½ feet deep leads to deeper water in the bay. Follow the N shore for 200 yards after entering in midchannel off the end of the spit; then cross the bay parallel with the spit at a distance of 200 yards, heading toward the S shore; then follow the S shore at a distance of 200 yards, steering toward the head of the bay. Around the shores are numerous houses and orchards, and a little-used log booming area.

Rocky Bay is the shallow inlet N of Vaughn Bay. A float landing, in 10 feet of water N of Windy Bluff, is used at low tide when Vaughn Bay cannot be entered. A channel 3 feet deep leads to the lagoon back of the sandspit near **Windy Bluff.** It is necessary to come around the small sand island N of the spit. Oysterbeds are in the E side of the bay N of the spit.

Allyn is a village on the W side of Case Inlet near the head about 0.5 mile N of **Sherwood Creek.** A public pier and launching ramp are here. An oyster wharf is just N of Allyn.

Good anchorage may be had anywhere N of Hartstene Island, in 6 to 15 fathoms, muddy bottom.

There are numerous farms and several small settlements whose chief industries are oyster culture, farming, and some logging. The flats near the head of the inlet are largely covered with oysterbeds.

Peale Passage, about 4 miles long, extends NW between Hartstene and Squaxin Islands, and connects with Pickering Passage. It has a controlling depth of about 10 feet. Strangers should not attempt it. The current at times attains a velocity of 2.0 knots in the narrow part of the passage, and sets N on the flood.

Chart 18456.–Dana Passage, between **Brisco Point,** the S point of Hartstene Island, and the mainland, is about 2 miles long. It is the main route to Budd Inlet and Olympia, and also joins with three other bodies of water: Eld Inlet, Squaxin Passage, and Peale Passage. Squaxin Passage leads to Totten and Hammersley Inlets, and Peale Passage leads to Pickering Passage.

With the exception of Itsami Ledge near its E end, Dana Passage is clear and a midchannel course may be safely followed. The currents in Dana Passage frequently attain velocities of 3 knots or more.

Boston Harbor, a village in the cove of the same name just E of Dofflemyer Point, has a marina with berthage for about 40 craft, gasoline, water, and a launching ramp. Electronic repairs can be made here.

Budd Inlet, 29 miles by water from Tacoma, is about 6 miles long, extending S from Dana Passage and terminating in flats that are bare. The entrance is between Cooper Point and **Dofflemyer Point;** the latter is marked by a light and fog signal. The entrance to Budd Inlet is deep except for the 28-foot shoal in the middle of the entrance. The shores are comparatively low and wooded, and the depths shoal less abruptly on the E than on the W side of the inlet. The S half of the bay is obstructed by flats and shoals that bare for 0.8 mile, through which channels have been dredged to the Olympia waterfront.

Olympia, the capital of the State of Washington, is a lumber port at the head of Budd Inlet. Over 90 percent of the waterborne traffic of the port concerns lumber and logs.

Prominent features.–The capital dome and the radio tower on the N end of the port fill area are prominent landmarks from outside the entrance channel.

Channels.–A Federal project provides for a 30-foot channel from deepwater in Budd Inlet to a 30-foot turning basin off the W side of the port terminal near the head of the harbor. The channel is marked by lights, buoys, and lighted ranges. (See Notice to Mariners and latest editions of charts for controlling depths.)

Anchorage.–Good anchorage may be had anywhere inside the entrance in muddy bottom.

Dangers.–Olympia Shoal, which bares, is about 0.4 mile off the W shore, 3 miles inside the entrance. A light is on the E side of the shoal, and on its W side are lights marking the approach to the dredged channel. There are numerous shoals, piles, dolphins, and log booms on the E side of the harbor.

A restricted area for berthing of Maritime Commission vessels is on the E side of the inlet. (See 162.270, chapter 2, for limits and regulations.)

SE of Olympia Shoal is a **177°15′-357°15′ measured course,** 6,201 feet long. Olympia Shoal Light and Olympia Channel Light are the markers.

Tides.–The mean range of the tide at Olympia is 10.5 feet, and the diurnal range of tide is 14.4 feet.

Pilotage is compulsory for all vessels except those under enrollment or engaged exclusively in the coasting trade on the W coast of the continental United States (including Alaska) and/or British Columbia. Licensed pilots can be obtained for Puget Sound from the Puget Sound Pilots or the Washington Pilots Association. (See **Pilotage,** chapter 12, for details.)

Towage.–Tugs to 1,200 hp are available from Tacoma and to 5,000 hp from Seattle. No large tugs are stationed in Olympia.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Olympia is a **customs port of entry.**

There is a hospital in Olympia.

Wharves.–The port terminal, owned and operated by the Port of Olympia, is on the E side of the turning basin near the head of the harbor; it is the only deep-draft facility in Olympia Harbor. The port reports that depths of 40 to 45 feet are maintained alongside the terminal's 2,000-foot W face; deck height is 22 feet. Contact the Port of Olympia for the latest controlling depths. The terminal is served by two 50-ton gantry cranes with 120-foot booms, several mobile log handlers ranging from 10-to 45-ton capacity, a rail car switcher, and other modern cargo-handling devices. More than 100,000 square feet of covered and 40 acres of open storage is available. The port-owned cold storage warehouse with over 136,000 cubic feet of freeze and cooler space is at the terminal. The wharf face is fitted with double ship-side trackage.

A large pole plant is on the NE end of the peninsula at the head of the bay. The lumbermills formerly at the head of the bay have ceased operations leaving the port wharf as the only facility shipping or receiving waterborne commerce.

Supplies.–Water, ice, groceries, and some marine supplies can be obtained. Diesel fuel, gasoline, and lubricants are available.

Repairs.–Only small craft can be repaired in Olympia. There are no facilities for repairs to oceangoing vessels; the nearest such facilities are in Seattle, Wash. Machine shops are in the city.

Small-craft facilities.–There are several marinas at Olympia. About 200 berths, electricity, gasoline, diesel fuel, water, ice, launching ramps, storage, and marine supplies are available. A 4½-ton hoist, and a marine railway that can handle craft to 20 feet are at a marina just N of the port wharf. Hull and engine repairs can be made at a marina just S of the port wharf. A private yacht club has its moorings at the head of the inlet 0.3 mile S of the turning basin.

Storm warning signals are displayed at a marina on the E side of the peninsula at the head of Budd Inlet.

Communications.–Olympia is served by Interstate Highway 5, U.S. route 101, and by State routes 8 and 510. Two major railroads provide freight service. Olympia Airport is 4.5 miles S of the city.

Chart 18448.–Eld Inlet, locally known as **Mud Bay,** immediately W of Budd Inlet, is of little commercial importance. It affords good anchorage inside the entrance in 24 to 42 feet, soft bottom. A midchannel course is clear to the flats at its head. In entering, **Cooper Point,** the E point at the entrance, should be given a berth of not less than 0.2 mile. Some logging and oystering are done here.

Squaxin Passage (see also chart 18457), S of **Squaxin Island** and **Hope Island,** is about 1 mile long and leads to Totten and Hammersley Inlets. A light on Hunter Point marks the SW entrance point of the passage. The N shore is foul; a shoal covered 19 feet is 150 yards off the W shore of Hope Island abreast Steamboat Island.

The passage is narrow, and strangers should proceed with caution. The S shore should be favored, and, at the W end, the N point of Steamboat Island should be favored. The principal danger in the passage is a reef which bares at extreme low water, SE of Hope Island; a buoy is near its S end. This reef is easily avoided by keeping the N point of Steamboat Island well open of the S point of Hope Island. Tide rips are said to occur in Squaxin Passage. The usual velocity of the current is about 1.5 knots.

The passage between Hope and Squaxin Islands has a least depth of 9 feet in the middle; greater depths can be carried in the passage with local knowledge.

Steamboat Island, covered with private homes, is connected with **Carlyon Beach** on the mainland by a roadway on piling. The island, practically a part of the mainland, has abrupt shores and is heavily wooded. The NW end of the island terminates in a long sandspit marked on the end by a daybeacon. A private pier is on the NW side of the island, and a pier and large building of a private yacht club are on Carlyon Beach just E of the roadway on piling.

Totten Inlet extends 9 miles SW from the W end of Squaxin Passage. A depth of 30 feet can be carried to a point off the entrance to Skookum Inlet. A 3½-fathom shoal is about in midchannel at the entrance, 620 yards SW of the S end of Steamboat Island. A spit extends W for about 100 yards from Steamboat Island. In entering, favor the W shore to avoid the spit and shoal. The inlet shoals gradually to near **Burns Point,** 100 feet high, on the S shore, where it bares at low tide.

Oyster Bay, S of Burns Point, is an extensive mudflat; oysters are grown in this area, and there are log booms. S of the entrance to **Little Skookum Inlet,** along the shores of Totten Inlet, are rock or concrete walls enclosing the oysterbeds. The walls are a danger to navigation, and the oyster industry discourages boatmen from entering these waters. Oyster-processing wharves are on the N side of the inlet. Local knowledge is required to get to them. Good anchorage may be had anywhere inside the entrance of Little Skookum Inlet.

Chart 18457.–Hammersley Inlet indents the W shore of the sound about a mile N of the W end of Squaxin Passage. It is about 6 miles long, expanding at its head into **Oakland Bay,** which is 3.5 miles long in a NE direction. The inlet is obstructed by shoals, particularly at its mouth, where there is an extensive bar. The rocky shoals have been partly removed. The channel, marked by some lights and buoys, has a controlling depth of about 10 feet to the town of Shelton on Oakland Bay. It is navigated only by small craft, and by tugs with log rafts and railroad car floats; local knowledge is required. Tidal current velocities may reach 5 knots at times in the constricted parts of the inlet. (See Tidal Current Tables for current predictions.) Vessels enter on the flood, usually after half tide, and leave on the ebb, usually before maximum strength. Hammersley Inlet is considered dangerous for strangers.

Vessels with sharp rise of bilge should avoid the inlet as there is danger of capsizing in the strong current in case of grounding.

Arcadia is a small settlement on the S point of the entrance of Hammersley Inlet. It has a public ramp for launching small pleasure craft. A light is on the point E of Arcadia.

Shelton, at the head of the inlet, is a town of some commercial importance. Extensive logging, lumber, and lumber product manufacturing interests are centered here. The W end of **Oakland Bay** is used primarily as a storage area for logs trucked in from the Olympic Peninsula to be used by the mills at Shelton. Hammersley Inlet receives little commercial traffic. The mill stack is prominent from a considerable distance. Shelton is on a branch of the Burlington Northern Railroad; lumber is shipped largely by rail, however, some railroad car ferrying is done. Railway trestles used as log dumps extend E across the flats from the Shelton waterfront. The Port of Shelton marina, 0.3 mile from the head of the Shelton waterfront and on the N shore, has berths, electricity, gasoline, and water. A yacht club has its facilities at the marina. Some marine supplies are available in the town. There are no haulout or repair facilities at Shelton. Oysters are cultivated in the shoal portions of Oakland Bay.

14. HAWAII

Chart 540.–Hawaii, a Polynesian kingdom until 1893 and then briefly a republic, requested and was granted annexation to the United States in 1898 and was given a territorial form of government in 1900. By Presidential proclamation of August 21, 1959, Hawaii officially became the 50th of the United States.

The **Hawaiian Islands,** an archipelago, consist of eight large islands, plus many islets, reefs, and shoals, strung out from SE to NW for 1,400 nautical miles in the north-central Pacific Ocean. The archipelago extends from 18°55'N. to 28°25'N., and from 154°49'W. to 178°20'W., straddling the Tropic of Cancer. All the islands of the archipelago, except 2-square-mile Midway, are part of the State of Hawaii.

The capital and chief population center of the State is Honolulu on the island of Oahu; the port is 2,091 nautical miles from San Francisco, 4,685 miles from the Panama Canal, and 2,477 miles from Anchorage, Alaska. Land area of the State totals 6,425 square statute miles, of which the "Big Island" of Hawaii alone accounts for nearly 63 percent. The other seven large islands are, in order of size, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahoolawe.

The major islands are mountainous and of volcanic origin; the Island of Hawaii has two volcanoes that are still active. Elevations range from sea level to nearly 14,000 feet, with many peaks in excess of 2,500 feet. Although coastal plains, valley floors, and certain plateaus are relatively flat, much of the surface is quite rugged, with high ranges and deep ravines or gorges.

Nearly all of the island streams may be classified as mountain torrents, although some of them can be navigated for short distances by small boats. Most of the streams are on the N and E coasts, where rainfall generally is heaviest.

The 20-fathom depth curve is seldom more than a mile from shore and usually is not far from the coral reefs that fringe much of the island coastline. The bottom generally pitches off rapidly to great depths from a narrow coastal shelf, and the few off-lying dangers usually are indicated by breakers or by a change in color of the water. Under normal conditions the color of the water changes from a deep blue in the open ocean to a blue-green between the 10 and 15-fathom curves; bottom features become visible at 6 to 7 fathoms.

Agriculture is Hawaii's bedrock industry. Sugar exports total over a million tons annually, and the State produces and exports well over half of the world's output of canned pineapple. Truck farming is intensive, particularly on the Island of Oahu, and cattle ranches range from small to very large (one of the largest cattle ranches in the United States is on the Island of Hawaii). Military expenditures and tourist trade are major sources of income.

Polynesian-English Geographic Glossary

Following are the English meanings of Polynesian words that occur frequently in Hawaiian geographic names:

Ana–cave
Awa–harbor
Hale–house
Heiau–temple
Hono–harbor
Kai–sea
Kapu–prohibited
Kona–south
Koolau–north
Lae–cape
Lapa–ridge
Loko–pond
Lua–crater
Mauna–mountain
Moana–ocean
Moku–islet
Pali–cliff
Pele–volcano
Puu–hill
Wai–water
Wailele–waterfall

Emergency signal flag.–The State of Hawaii has adopted an emergency signal flag as one of the signals that may be used or displayed when a vessel is in need of assistance; the flag should be at least **2 feet square** and **international orange** in color. This distress signal is authorized by the Hawaii Boating Law.

Harbors and ports.–Honolulu is by far the largest commercial deepwater facility in Hawaii. Other commercial deepwater harbors are Hilo and Kawaihae on Hawaii Island, Kahului on Maui, and Nawiliwili and Port Allen on Kauai. These ports service both overseas and interisland shipping.

Hawaii has several commercial barge harbors engaged in interisland shipping. Some of the more important are at Kaumalaupau on Lanai, and Kaunakakai, Haleolono, and Kalaupapa on Molokai. These harbors service only light-draft vessels.

Marine radio communications.–Honolulu is the only port that maintains a commercial radio communication watch. Vessels desiring services at other Hawaiian ports must make arrangements in advance.

COLREGS Demarcation Lines.–The lines established for the Hawaiian Islands and United States Pacific Island Possessions are described in 80.1410 through 80.1495, chapter 2.

Control over movement of vessels.–Regulations require advance notice of vessel's time of arrival to Captain of the Port. (See Part 124, chapter 2.)

All vessels are requested to exercise caution when navigating through the charted U.S. Navy submarine transit lanes.

Anchorages are numerous except on the N and E sides of the islands where shelter from the trade winds is a major requirement. The anchorages on the S and W sides of the islands are unsafe during kona weather.

Tides.-The periodic tides around Hawaii average only 1 to 2 feet. The tides along the N coasts usually occur about 1 to 1½ hours earlier than the tides along the S coasts. (See Tide Tables for daily predictions of times and heights of high and low waters for Honolulu.)

The effect of strong winds added to normal tidal action may cause water level to fall considerably below chart datum and/or rise considerably above mean higher high water. A heavy surf, particularly from N, gives the impression of higher tides on the exposed beaches; there is usually little actual increase under such conditions. On the S side of Oahu, where the trades usually blow directly off the land, a shift to kona winds or to a calm has been observed to raise the tide level a few tenths of a foot.

Currents.-The variable oceanic currents in the vicinity of Hawaii are believed to depend mostly upon the velocity and direction of the wind, but there are many reports of strong NE currents setting against the prevailing trades. There is a prevailing W oceanic drift in the vicinity of the larger islands and as far W as Necker Island.

The tidal currents are generally rather weak and are influenced by winds and oceanic movements. Such currents are mainly reversing in the channels between the larger islands, but they are rotary in more open waters, particularly around the W islets, and shift direction continuously in a clockwise movement.

Tsunamis (seismic sea waves).-The Hawaiian Archipelago has been visited from time to time by tsunamis, which caused enormous destruction. Loss of life and property can be lessened by intelligent response to warnings that such waves are imminent. (See chapter 1 for basic discussion.)

The National Oceanic and Atmospheric Administration administers a tsunami warning system that alerts the Hawaiian Islands, other Pacific islands, and most of the countries bordering the Pacific. The system has an operating center at the Pacific Tsunami Warning Center, Ewa Beach, Oahu, and includes scattered seismograph stations for quick detection and location of submarine earthquakes, a network of wave-detecting and reporting stations throughout the Pacific, a high-priority communication setup, and an extensive international arrangement for broadcasting warnings of possible sea waves.

Military authorities in Honolulu will issue warnings to all military bases that might be affected. Local base commanders will put into effect any precautions deemed necessary. Elsewhere warnings will be broadcast by civilian authorities. Disaster committees have been set up on all the major islands to alert the population and to assist in evacuation and rescue as needed. In Honolulu and Hilo, former air raid sirens now operated by the police department will be used. On Oahu, Civil Air Patrol planes equipped with sirens will fly the shoreline and sound the alarm. This service will later be extended to the other islands. On all the major islands, police cars equipped with sirens will patrol the coastal areas. Local commercial broadcasting stations will interrupt all programs to give the latest information and instructions.

All warnings will also be broadcast by the National Weather Service on NOAA Weather Radio. (See appendix for locations and frequencies of the stations.)

Should a warning occur when a radio station is closed down, it will come on the air immediately and remain on until the all clear is sounded. When an alarm is given, all persons are warned to turn on their radios to a local broadcasting station for information and instructions. If they have no radio and cannot find access to one nearby, they should seek high ground. Telephones are apt to be flooded with calls and therefore cannot be relied on during a warning.

When a warning is received, persons should vacate waterfront areas and seek high ground. The safest procedure for ships will depend upon the amount of time available, and this may not always be known. A ship well out at sea would ride such waves safely, and hence, if time is available to put to sea, that would be the safest action. During the 1946 wave, the master of a ship lying offshore near Hilo felt no unusual waves, though he could see great waves breaking on the shore. Crews of fishing boats in the Hawaiian area also reported no unusual conditions at that time. On the other hand, the crew of a ship in the harbor may have a difficult time averting serious damage.

The destructive force is usually greater on the sides of the islands facing the oncoming waves, but this directional effect is frequently lacking and the waves may reach their greatest heights on the leeward sides of the islands. The waves may also attain great heights in funnel-shaped bays and at capes or other places where a submarine ridge projects seaward toward the oncoming wave. Unusual heights may be attained at any place where two waves traveling different paths arrive at the same time to reinforce each other. There is still much to be learned about these waves, and the best policy is to avoid them in any way possible.

Weather.-The tables following the appendix includes climatological tables for Honolulu, Hilo, and Lihue. The appendix lists National Weather Service offices, and radio stations which transmit weather information.

General.-The climate of the Hawaiian Islands is unusually pleasant for a tropical area, the result principally of the marked marine influence and the persistent trade winds. Considering the latitude of the islands, there is relatively little uncomfortable heat. The discomfort that is occasionally experienced usually occurs when the trades are temporarily displaced by light variable or S winds, which are accompanied by comparatively higher humidities. The outstanding climatic features of the islands are the dominant trade-wind influences throughout all seasons, the remarkable variation in rainfall over adjacent areas, and the uniform temperature regime which varies slightly throughout the year.

During the summer season the trades blow with a high degree of persistency. As a result, uncomfortable periods are usually delayed until fall, and thus follow by weeks or possibly as much as 2 months the period when the highest temperatures occur. Rains most frequently fall at night.

Thunderstorms are infrequent and practically never severe. Hail seldom occurs. Occasionally local storms are accompanied by winds of sufficient force to do limited damage, but severe storms such as hurricanes or tornadoes are rare. So-called thick weather is almost unknown to the extent of seriously interfering with shipping, and is usually confined to mist and rain, rather than being in the form of fog. Interference to shipping or travel because of bad weather is almost unknown.

Pressure and general circulation.–The strongest influence in the pressure pattern underlying the general circulation of air over the Hawaiian Islands area is the persistent and semipermanent high-pressure cell known as the Pacific high. The clockwise circulation around this cell, coupled with a slight deflection of the surface winds away from the high pressure, result in the NE trades that are the dominant winds of the area.

Winds.–The trade-wind influence is dominant in all seasons throughout the greater part of all the islands. In some local areas, winds deviate from the general pattern because of topography. In coastal areas where mountains to the E project high above sea level, as they do in the kona districts of the Island of Hawaii, the trades are cut off, resulting in prevalent SW winds with land and sea breezes in evidence. Such effects may be rather general in some areas and extremely local in others.

Tropical cyclones.–The Hawaiian Islands lie on the extremities of both the W North Pacific typhoon area and the E North Pacific hurricane area. Therefore, a tropical cyclone from either region is rare.

Typhoons can form in any month, but they rarely cross 180°; when they do they are usually extratropical and well N of the islands. It is not impossible, but highly improbable, that a typhoon will move through the Hawaiian Islands.

It is more probable that an E North Pacific hurricane would hit the islands. These storms, prevalent from May through November, originate from the North American coast W between 10°N and 20°N. Most hurricanes either recurve or dissipate before reaching the Hawaiian Islands. August is the most favorable month for one of these storms to reach the area, although they have occurred from July through November.

Kona weather.–The word "kona" is of Polynesian origin and means leeward. It refers to the S winds and accompanying weather on the normally leeward slopes of the principal Hawaiian Islands which, because of the wind shift, have temporarily become the windward slopes.

The konas, which occur most frequently during October through April, provide the major climatic variations of the Hawaiian Islands. During these storms, heavy rainfall and cloudiness can be expected on the lee sides of coasts and slopes, which, under the usual wind pattern, receive less cloudiness and may have almost no rain. Near gales may occur, especially near points where the air tends to funnel into sharp mountain passes near the coasts. At such times leeward anchorages may become unsafe for smaller craft.

Precipitation.–The complicated rainfall pattern over the islands results chiefly from the effects of the rugged terrain on the persistent trade winds. Frequent and heavy showers fall almost daily on windward and upland areas, while rains of sufficient intensity and duration to cause more than temporary inconvenience are infrequent over the lower sections of leeward areas.

In the districts where the trade winds are dominant, rains are decidedly heavier at night than during the day. This applies generally to the greater part of the islands. Daytime showers, usually light, often occur while the sun continues to shine.

Considerably more rain falls from November through April over the islands as a whole than from May through October. It is not unusual for an entire summer month to go by without measurable rain falling at some points on the Maui isthmus; at times considerably longer dry periods may occur in that locality.

Temperature.–Elevation is the major control factor in determining temperatures, although location, whether in a leeward or windward position, is also a noticeable factor. The highest temperatures reached during the day in leeward districts are usually higher than those attained in windward areas. The daily range is also greater over leeward districts where, because of less cloudiness, the maximum temperatures are higher and the minimum temperatures usually lower.

August and September are the warmest months, and January and February are the coldest. At Honolulu there is an average monthly range between a low of 72.5°F in January and February, and a high of 79.4°F in August. The extreme range of temperature at Honolulu for the 5-year period of record is from a low of 56°F for January, to a high of 93°F recorded in September. This spread of only 37°F between the extreme high and extreme low temperatures is small when compared with ranges at Pacific coast ports.

Humidity.–All coastal areas are subject to the relatively high humidities associated with a marine climate. Humidities, however, vary considerably, with high percentages over and near the windward slopes to low percentages on the leeward sides of the higher elevations.

At Honolulu the normally warm months of August and September are usually comfortable because of the persistency of the NE trades which bring moderate humidities. Unpleasant weather is more likely later during the autumn or early winter when the trades may diminish and give way to S winds. During these periods known locally as "kona weather" ("kona storms" when stormy), the humidity may become oppressively high.

Routes.–Between the islands, proceed on rhumb lines as direct as safe navigation permits.

Honolulu to Panama.–Rhumb lines through 21°14′N., 157°39′W., and 21°18′N., 157°00′W.; thence great circle to 8°40′N., 88°00′W., off shoals reported S of Guardian Bank; thence rhumb lines through 7°05′N., 81°45′W.

Honolulu to San Diego, Los Angeles, San Francisco, and Strait of Juan de Fuca.–(See routes in chapter 3.)

Honolulu to Anchorage.–Rhumb lines through 21°19′N., 157°36′W., and 59°00′N., 151°20′W.

Caution.–Fish aggregating buoys have been established by the Division of Fish and Game, State of Hawaii, in the Hawaiian Islands between Hawaii and Niihau. The buoys are 6 feet across at the base and show a flashing white 1-second light atop a 5-foot steel pole. The buoys display 12-inch white letters against an orange backdrop. These buoys frequently break loose, and/or become unlighted.

Loran and Radar.–Loran reception within the island chain is good, however, most mariners rely on a combination of visual and radar piloting for interisland navigation. It is reported that landfall at a distance of 20 to 30 miles is not uncommon. The generally high, rugged coastline of the islands provide good and well-defined radar returns; some navigators have reported radar contact at 40 miles.

Pilotage.–This is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade. Hawaii Pilots provide pilotage service to several ports in the islands, namely, Honolulu Harbor, Hilo Harbor, Kahului Harbor, Port Allen Harbor, Nawiliwili Harbor, and Kawaihae Harbor. Specific information is given in the description of the various ports.

Towage.–Tugs are available at the more important ports. (See description of port for further information.) Honolulu has some salvage equipment.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) There are good private hospitals on Hawaii, Maui, Lanai, Oahu, and Kauai.

Honolulu is a **customs port of entry.** (See appendix for lists of other ports of entry.)

Harbor regulations.–These are established by the Harbors Division, Hawaii Department of Transportation, which also assigns harbormasters to the deepwater ports and the commercial barge harbors.

Supplies.–Honolulu is the principal supply center for the State. Water is available at most of the wharves and piers at the deepwater ports. Gasoline, diesel fuel, ice and minor items of marine supplies are available at the smaller ports.

Repairs.–Honolulu has a floating drydock that can handle medium-size vessels. The other ports have only minor facilities for small vessels.

Communications.–Honolulu is a major port of call for transpacific passenger and cargo vessels; air service, passenger and freight, includes scheduled flights to the other islands, to the mainland, and to W and SW Pacific areas. The other deepwater ports have regular interisland barge service and are irregular ports of call for transpacific vessels; interisland passenger travel is almost entirely by air.

Standard time.–The State of Hawaii uses Alaska-Hawaii standard time, which is 10 hours slow of Greenwich mean time. Example: When it is 1200 at Greenwich, it is 0200 in Honolulu. Midway Islands use Bering standard time, which is 11 hours slow of Greenwich mean time. Example: When it is 1200 at Greenwich, it is 0100 at Midway Islands.

Daylight saving time.–Daylight saving time is not observed in the State of Hawaii.

Chart 19320.–Hawaii Island, at the SE end of the archipelago, is the "Big Island"; its area of 4,021 square statute miles is twice that of all the other islands in Hawaii State combined. The island is roughly triangular in shape, 82 nautical miles N to S and 72 miles E to W.

Caution.–Sugarcane mills dump refuse directly into the ocean, and discolored water is often present 0.5 mile offshore from the mills. Patches of floating cane are frequent in the offshore waters and can foul small-craft propellers.

Hawaii is also the **Volcano Island;** it has five volcanoes, two of which–Mauna Loa and Kilauea–are still active. **Mauna Kea** and **Mauna Loa,** the two volcanoes that dominate the island, rise to heights of nearly 14,000 feet and are the highest in the State; from their summits, the land descends gradually with occasional cinder cones and lesser peaks dotting the slopes. Lava flows are numerous, and some reach the coast. **Kilauea,** 20 miles E of Mauna Loa and 9 miles from the SE coast, appears to be a crater in the side of its towering neighbor, but is really a separate peak with an elevation of more than 4,000 feet.

Hualalai, a volcano dormant since 1801, rises to an elevation of 8,269 feet near the middle of the W coast. A peak of the **Kohala Mountains** rises to an elevation of 5,505 feet from the **Kohala Peninsula** at the NW end of the island.

A highway encircles the island, and another leads from Hilo to Waimea by way of the pass between Mauna Kea and Mauna Loa.

Anchorages.–There is little shelter from the NE trades along the NE and SE sides of the island. Good anchorage is available along much of the W coast, but there are some areas so steep-to that anchorage is not practicable.

Currents.–The currents generally follow the NE trade wind, but occasionally set against it. One current follows the coast NW from Cape Kumukahi, the E extremity of Hawaii, and around Upolu Point, the N extremity. Another current follows the coast SW from Cape Kumukahi around Ka Lae, the S extremity, and thence N to Upolu Point; the latter flow is accompanied by an inshore counter current which sets SE from Hanamalo Point around Ka Lae and thence NE to Keauhou Point. An inshore current sets N from Hanamalo Point and sometimes attains considerable velocity. There are reports of strong NE currents off Makolea Point and strong N currents at Mahukona; another report states that currents offshore from Makolea Point set E toward the coast. Currents are weak at Kawaihae; SW currents with velocities of 0.5 knot have been observed in Honokaope and Kiholo Bays.

Weather.–The NE trade winds seem to divide at Cape Kumukahi, one part following the coast NW and losing its force when it rounds Upolu Point, the other part following the coast SW and around Ka Lae. On the W coast of Hawaii, except at Mahukona, the sea breeze sets in about 0900 and continues until displaced by the land breeze that usually springs up after sundown. Vessels bound E to ports on the windward side of the island should pass Upolu Point close-to and avoid the heavier offshore winds.

During the trades, the NE coast frequently is clouded over in early morning, but there is clear weather 1 or 2 miles offshore; when the breeze picks up about 0900 the clouds are driven inland. Rainfall varies greatly with locality; the greatest amount is along the windward side, the kona highlands get a moderate amount, and a little reaches the Kau District and the W coast.

The NE coast of Hawaii Island has a length of about 77 miles between Upolu Point, the N extremity, and Cape Kumukahi, the E extremity. This coast is mostly bold, and all dangers can be avoided by giving it a berth of 2 miles. Hilo Bay is the only sheltered harbor or anchorage.

Chart 19327.–The numerous bluffs in the vicinity of **Upolu Point** appear quite similar from seaward. Several structures are prominent on the point; two quonset line shacks on the S side of a small public airfield, an aerobeacon atop a wooden tripod, and a tower marked by lights, 2.3 miles to the SW. The country back of the point is planted in sugarcane; the camps and villages are generally situated high on the bluffs and among the occasional clumps of trees.

Kauhola Point Light (20°15.0'N., 155°46.5'W.), 115 feet above the water, is shown from an 85-foot white cylindrical concrete tower on the low point 5 miles E of Upolu Point. A dangerous reef, usually marked by breakers, extends 0.3 mile from Kauhola Point; passing vessels should give the point a berth of 2 miles.

Local vessels sometimes anchor in **Keawaeli Bay,** on the W side of Kauhola Point, in depths of 9 fathoms with the light 0.3 mile distant on bearing 090°. Protection is afforded vessels forced to leave anchorage on the W coast during kona storms. **Kohala Mill** , the principal village in the vicinity, is a mile inland from the light; a stack is prominent. Another stack 1.7 miles W, at Union Mill, is also prominent.

Akoakoa Point, 2.8 miles SE of Kauhola Point, is the E limit of the Kohala District sugar plantations. The country SE of Akoakoa Point rises gradually to the **Kohala Mountains,** which are heavily wooded to their summits.

Chart 19320.–The 10-mile stretch of coast between Akoakoa Point and Waipio Valley is backed by cliffs ranging up to 1,300 feet in height, and deep gorges that extend well inland. Waterfalls are numerous. The cliff faces have a general brownish appearance, but in some places they are covered with vegetation from top to bottom.

Honokane Iki Stream empties into a narrow bay about 9.2 miles SE of Upolu Point. The bay affords fair protection and possible landing places for small boats. A rock awash, 0.5 mile offshore from the stream, is surrounded by depths of 12 to 14 fathoms. A rock, covered 2 fathoms, is about 0.75 mile E of the bay in about 20°12'01"N., 155°42'20"W.

Two rocky islets, the larger 230 feet high, are about 300 yards offshore 0.8 mile SE of Honokane Iki Stream. Between Akoakoa Point and the islets, the bottom is fairly regular and slopes gradually to the 20-fathom depth curve, which is about 0.7 mile offshore.

Waimanu Valley, 14.5 miles SE of Upolu Point, splits the highest cliffs in the vicinity and is the second largest ravine along this coast. Waimanu Bay may be used as an anchorage in favorable weather; there are depths of 7 fathoms 0.2 mile offshore from the ravine.

Waipio Valley, the largest ravine along this coast, is 17.5 miles SE of Upolu Point. The valley is a remarkable cleft in the bluffs and is easily recognized. Taro is grown in the vicinity of **Waipio,** a small village near the mouth of the valley. In favorable weather, anchorage may be found in depths of 7 to 9 fathoms 0.3 mile off the valley or under the bluffs to the E.

From Waipio Valley E the cliffs become lower, and at Kukuihaele the coast is a comparatively low bluff 30 to 300 feet high. The slopes between Waipio Valley and Hilo are planted in sugarcane to an elevation of about 2,000 feet; continuing upward toward Mauna Kea, the slopes are wooded to about 2,600 feet and then present a barren appearance. Mauna Kea is frequently snowcapped during the winter.

Chart 19322.–Kukuihaele Light (20°07.9'N., 155°33.5'W.), 154 feet above the water, is shown from a 34-foot white pyramidal concrete tower at **Kukuihaele,** 19 miles SE of Upolu Point.

Honokaa, 24 miles SE of Upolu Point, is marked by two storage tanks on a low bluff. The lone stack of a mill 1 mile S of the landing can be seen among a large clump of trees. A reef that usually breaks extends 170 yards N from the landing and is marked by several bare rocks. No shelter is available during normal weather, as the landing is open to the N and E.

Chart 19326.–Paauhau, 26 miles SE of Upolu Point, is marked by the masonry of the abandoned inclined railway that leads to the top of the bluff. A mill with a tall stack is on the bluff 700 yards SE of the landing. The deep gulches on either side of the mill are spanned by trestles. The shore at the foot of the bluff consists of rocks and ledges over which the sea breaks constantly. The small concrete landing at the foot of the masonry incline offers little protection from the NE trades.

Chart 19320.–Paauilo is 31 miles SE of Upolu Point and a mile inland. A mill stack, near the top of the bluff on the seaward side of the town, and a skeleton steel water tank above Paauilo are prominent.

Ookala, about 36 miles SE of Upolu Point, is on the edge of a bluff on the S side of a deep gulch. A mill stack can be seen from seaward, but most of the buildings are hidden by the trees.

Kaawalii Gulch is about 1.5 miles SE of Ookala. In this locality the country back of the coast changes slightly in appearance; hummocky fields are noticeable.

Laupahoehoe Point, 39 miles SE of Upolu Point, is low and flat and makes out about 0.3 mile from a deep gulch. **Laupahoehoe Point Light** (19°59.8'N., 155°14.6'W.), 39 feet above the water, is shown from a pole with a red and white diamond-shaped daymark on the point. The outer end of the point is a mass of black lava rock which is broken into detached ledges that extend 250 yards seaward from the light. The seas usually break with considerable force over the ledges.

Laupahoehoe is at the inner end of the point. An abandoned boat landing is in a 30-foot opening in the rock on the SE side of the point. The landing affords some protection for small boats, but its use is not recommended when considerable swell is running.

Papaaloa, 1.5 miles SE of Laupahoehoe, can be identified by a waterfall directly under a mill and stack on the edge of the bluff. A horizontal string of bright lights makes a good mark at night.

Maulua Bay, 1.7 miles SE of Papaaloa, is a 0.3-mile indentation in the coast at the mouth of a gulch which is spanned by a high bridge. In favorable weather, small boats could be beached on the shingle at the head of the bay. Only slight protection is afforded from the NE trades. **Ninole** is 1.5 miles SE of the bay.

Honohina, 6.5 miles SE of Laupahoehoe Point, is a settlement on the plain between two gulches. No stacks or prominent buildings are to be seen from seaward. The land has lost its hummocky appearance, and the cane-covered fields are more uniform, although still broken by gulches. Between Honohina and Hilo the bluffs gradually decrease in height and finally disappear.

Hakalau Bay, 8.5 miles SE of Laupahoehoe Point, lies at the mouth of **Hakalau Gulch.** Prominent from offshore are a high trestle spanning the gulch, an abandoned mill and buildings lying in the gulch at the base of the S bank, and several buildings on the highland just S of the gulch and quite close to the edge of the bluff. At night, a row of prominent lights extends from the highland down to the gulch.

Wailea is a small settlement a mile S of Hakalau Bay and just N of **Kolekole Gulch.**

Honomu is at the mouth of a gulch 10.5 miles SE of Laupahoehoe Point.

Pepeekeo Point, 52 miles SE of Upolu Point and 25 miles NW of Cape Kumukahi, is the most prominent point in the vicinity. **Pepeekeo Point Light** (19°51.0'N., 155°05.1'W.), 147 feet above the water, is shown from a 75-foot white pyramidal skeleton tower on the N side of the entrance to Hilo Bay. During the day, the light tower is obscured by trees. **Papaikou,** 4 miles S of Pepeekeo Point, is on the W side of Hilo Bay.

Chart 19324.–Hilo Bay has an entrance width of 8 miles between Pepeekeo Point on the N and Leleiwi Point on the SE; the head of the bay is 4 miles inland. **Hilo,** on the SW side of the bay, is second in importance of the commercial deepwater harbors in the State of Hawaii.

The W shore of Hilo Bay is bluff, but the S and SE shores are low. The outer bay is exposed to the NE trades, but the inner harbor is protected by a breakwater on Blonde Reef. There is frequently a heavy swell which is deflected E by the W shore and causes considerable surge at the wharves behind the breakwater. The W end of the breakwater is marked by a light.

Prominent features.–Paukaa Point Light (19°45.9'N., 155°05.5'W.), 145 feet above the water, is shown from a white pyramidal concrete tower about 2 miles N of Hilo. The inactive sugar mill at **Alealea Point,** on the N side of the city, has a large stack, and just S of the mill is a high stone abutment. A lighted red and white water tank is on the SE side of Kuhio Bay.

The marine terminal is in **Kuhio Bay,** behind the inner end of the breakwater. S of the terminal is a large commercial airport; the aero light at the airport can be seen many miles at sea.

A flashing amber warning light, privately maintained and shown 2 feet above the SW corner of the roof of the shed on Pier 2, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

COLREGS Demarcation Lines.–The lines established for Hilo Harbor are described in 80.1480, chapter 2.

Channels.–From deep water on the N, the channel to the inner harbor leads between the breakwater and the W shore, then turns sharply E and follows the S edge of Blonde Reef to the wharves in Kuhio Bay. A Federal project provides for an entrance channel 35 feet deep and a harbor basin of same depth in Kuhio Bay. Channel and basin are maintained at or near project depth; markers include lighted and unlighted buoys and a **097°30'** lighted range. In 1980, the harbormaster was enforcing a vessel draft restriction of 32½ feet.

Anchorages.–Anchorages may be obtained anywhere under the lee of the breakwater where depths are suitable. Good anchorage is available W of Kaulainaiwi Island in depths of 25 to 35 feet over good holding ground. Well protected small-craft anchorages with fair holding ground may be found in **Reeds Bay,** S of Kuhio Bay, and in the basin E of Pier 1. The Hilo harbormaster usually assigns deep-draft anchorages.

Special anchorages are on the S side of Hilo Bay and in the E part of Kuhio Bay at the S end of the breakwater. (See 110.1 and 110.128b, chapter 2, for limits and regulations.)

Dangers.–Blonde Reef has depths of 4 to 25 feet and extends 1.5 miles in a NW direction from the SE side of Hilo Bay. In general, the shoaling is abrupt on all sides of the reef. A lighted buoy is off the outer end of the breakwater, which extends the length of the reef.

Opposite Blonde Reef are two small islands on a reef that makes out 0.3 mile from the S shore; bare **Kaulainaiwi Island** is near the outer end of the reef and wooded **Cocoanut Island,** connected to the mainland by a foot bridge, is close to shore. A lighted buoy marks the outer end of the reef.

A large fleet of fishing boats operates in the outer part of Hilo Bay; the movements of these boats are uncertain, and approaching vessels should maintain a sharp lookout. The approach should be made from N, favoring the W shore and avoiding the NW part of Blonde Reef; vessels have gone aground on the N side of the breakwater.

Tides.–The mean range of tide is 1.6 feet and the diurnal range of tide is 2.4 feet at Hilo.

Currents.–A NNW current of about 1 knot has been reported in the approach to the harbor. After heavy rains, currents from **Wailoa River** and **Wailuku River** set N in the inner harbor.

Weather.–Hawaii lies well within the belt of NE trade winds generated by the semipermanent Pacific high-pressure cell to the N and E. The climate of the island is greatly influenced by terrain. Its outstanding features are the marked variations in rainfall with elevation and from place to place, the persistent NE trade winds in areas exposed to them, and the equable temperatures from day to day and season to season in localities near sea level.

Over the island's windward slopes, rainfall occurs principally in the form of showers within the ascending moist trade winds. Mean annual rainfall increases from 100 inches or more along the coasts, to a maximum of over 300 inches at elevations of 2,000 to 3,000 feet, and then declines to about 15 inches at the summits of Mauna Kea and Mauna Loa. In general, leeward (S and W) areas are topographically sheltered from the trades, hence from trade-wind showers and are therefore drier; although sea breezes created by daytime heating of the land move onshore and upslope, causing afternoon and evening cloudiness and showers. Where mountain slopes are steeper, mean annual rainfall may range from 30 inches along the coast to 120 inches at elevations of 2,500 to 3,000 feet. The driest locality on the island and in the State, with an average annual rainfall of less than 10 inches, is the coastal strip just leeward of the S portion of the Kohala Mountains and of the saddle between the Kohalas and Mauna Kea.

These marked contrasts in rainfall are reflected in soil and vegetation, with frequent abrupt transitions from lush tropical growth to near-desert conditions, such as occurs between Kilauea's wet windward slopes and the Kau Desert just to the S.

Within the city of Hilo itself, average rainfall varies from about 130 inches a year near the shore to as much as 200 inches in mountain sections. The wettest part of the island, with a mean annual rainfall exceeding 300 inches, is about 6 miles upslope from the city limits. Rain falls on about 280 days a year in the Hilo area.

Hawaii's equable temperatures are associated with its midocean location and the small seasonal variation in the amount of energy received from the sun. At Hilo, the range in average temperature from February and March, the coldest months, to August, the warmest, is only 5.2°F and the average daily range, 15.1°F. The highest temperature of record at Hilo Airport is 94°F; the lowest 53°F. Greater variations occur in localities with less rain and cloud, but temperatures in the mid-90's and low 50's are uncommon anywhere on the island near sea level.

The trade winds prevail throughout the year (although they may be absent for days or even weeks at a time) and profoundly influence the climate. However, the island's entire W coast is sheltered from the trades by high mountains, except that unusually strong trade winds may sweep through the relatively low (2,600-foot) saddle between the Kohala Mountains and Mauna Kea and reach the areas to the lee. But even places exposed to the trades may be affected by local mountain circulations. For example, the prevailing wind at Hilo Airport is not the NE trade, but the SW wind that drifts downslope off Mauna Loa during the night and early morning hours.

Except for heavy rain, really bad weather seldom occurs. Thunderstorms average only eight per year and are rarely severe. During the winter, cold fronts or the cyclonic storms of subtropical origin (the so-called kona storms) may bring blizzards to the upper slopes of Mauna Loa and Mauna Kea, with snow extending at times to 9,000 feet or below and icing nearer the summit.

Storms crossing the Pacific a thousand miles to the N, or kona storms closer by, may generate seas that cause heavy swell and surf along the N, E, and SW shores of the island.

The National Weather Service office is at the General Lyman Airport; **barometers** may be compared there or by telephone.

(See page T–10 for **Hilo climatological table.**)

Pilotage.–This is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade. with a Federal licensed pilot on board.

The pilot boat, IMUA, is yellow and 22 feet long with the word PILOT in black letters on the hull. The boat displays the standard pilot lights at night and the International Code flag "H" by day.

The pilot boarding station is about 1 mile E of Paukaa Light. The pilots monitor and use as a working frequency VHF-FM channel 12 (156.60 MHz).

Mariners are requested to give 24 hours advance notice of arrival and gross tonnage, length, and draft of vessel; telephone (808-537-4169). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots.

Towage.–Two diesel-powered tugs up to 1,600 hp are available at the port.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Hilo is a **customs port of entry.**

A Coast Guard patrol boat moors in the basin E of Pier 1.

Harbor regulations are established by the Harbors Division of the Hawaii Department of Transportation. In 1980, vessels with a draft of more than 32½ feet were restricted from the harbor. The **harbormaster** enforces the regulations and assigns anchorages.

Wharves.–The State-owned and operated piers are on the E side of Kuhio Bay. General cargo is usually handled by ships' tackle; fork lift trucks, a 20-ton mobile hoist, straddle carrier for containers, and two electric traveling bulk sugar loading towers are available. Transit sheds with 103,000 square feet of covered space, and 7.5 acres of open storage space are also available. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Pier 1: 1,255 feet of berthing space, 35 feet reported alongside; deck height, 9 feet; receipt of petroleum products, dry bulk fertilizer, and lumber; shipment of bulk raw sugar and molasses; receipt and shipment of general and containerized cargo.

Pier 2: 722 feet of berthing space, 30 to 35 feet reported alongside; deck height, 10 feet; receipt and shipment of general and containerized cargo by barge; receipt of bulk cement and lumber.

Pier 3: 636 feet of berthing space, 28 to 30 feet reported alongside; deck height, 9½ feet; receipt of petroleum products, liquefied petroleum gas, and lumber; shipment of molasses; and occasional receipt and shipment of general and containerized cargo by barge.

Hilo Bay is subject to heavy surge, particularly between October and mid-April. Large vessels make fast to mooring buoys when coming alongside Pier 1; this is necessary to assist in leaving the pier and for breasting off when the surge is excessive. The use of wire mooring lines is not advised.

Most of the small craft of the area berth at facilities 0.1 mile S of Wailoa River mouth; a light, daybeacon, and buoy mark the entrance. The fixed highway bridge at the entrance has a reported clearance of 8 feet. The channel is not well defined. In May 1976, the reported depths were 9 feet in the channel and 7 to 10 feet in the berthing area.

Supplies.–Gasoline, diesel fuel, bunker C, and water are available at the State piers; all fuels must be trucked in. Ice and some marine supplies are available in Hilo.

Repairs.–Hilo has no facilities for drydocking or making repairs to deep-draft vessels, the nearest facilities are in Honolulu. A marine railway at Hilo has a capacity of 50 tons. Several machine, electrical, and welding shops off the waterfront are available for making above-waterline repairs to vessels at the port.

Communications.–Hilo has regular interisland barge service and is a port of call for transpacific vessels, but interisland passenger travel is almost entirely by air. Telephone communication is available to the other islands and to the mainland.

Chart 19320.–Leleiwi Point, on the SE side of the entrance to Hilo Bay, is marked by a mass of bare, black lava rock about 20 feet high that extends 100 yards seaward from the tree line; the low point is difficult to identify at night.

The 17-mile stretch of coast between Leleiwi Point and Cape Kumukahi is a series of low bluffs meeting the ocean with abrupt descents of 10 to 40 feet. The shoreline is a jumble of lava boulders. **Keaau,** 6 miles S of Leleiwi Point and 3 miles inland, is marked by two mill stacks and a water tank; the seaward stack is the most prominent. The Olaa plantations rise to an elevation of about 2,000 feet, above which the forest may be seen. An old lava flow reaches the sea 4 miles NW of Cape Kumukahi and is marked by two black hills, about 50 feet high, lying close together at its seaward end.

Cape Kumukahi Light (19°31.2′N., 154°48.8′W.), 165 feet above the water, is shown from a 124-foot white square, pyramidal skelton tower on the E extremity of Hawaii Island. The cape is a low mass of bare, black lava with a jagged top and is clearly defined from all sides; sharp pinnacles mark the end of the point. A chain of old craters, or cinder cones, extends 7 miles SW from the cape; the nearest cone, 1.4 miles from the cape, is 245 feet high and is topped with scattered coconut palms; a large water tank is prominent atop the NE rim of the cone.

The SE coast of Hawaii Island is 63 miles long between Cape Kumukahi, the E extremity, and Ka Lae, the S extremity. This coast is mostly bold, but passing vessels are advised to keep at least 1 mile offshore. There are no all-weather harbors or anchorages.

The country SW of Cape Kumukahi is heavily wooded, and there are numerous coconut groves along the beach. Characteristic of this coast are the lava flows, bare and rough in appearance, which extend from the hills to the sea. The old craters SW from the cape join the ridge which forms the divide between the **Puna District** and **Kau District.**

Pohoiki, a small village 4 miles SW of Cape Kumukahi, has a boat launching ramp on the N shore of a small bight. The bight is protected by a breakwater marked by a light.

Puu Honuaula, 5 miles SW of Cape Kumukahi and 3 miles inland, is 844 feet high and quite prominent. The SE side is blown out, but the remaining slopes are cane-covered and the rim is fringed with trees.

Opihikao, a village 7 miles SW of Cape Kumukahi, is marked by a prominent grass-covered mound, 125 feet high, near its NE beach.

Kaimu, a village 13 miles SW of Cape Kumukahi, has a black sand beach that may be used as a boat landing during calm weather; the beach is steep and free from rocks.

Kalapana, a village 14 miles SW of Cape Kumukahi, is on the low ground N of **Hakuma Point**, a black flat-topped headland 65 feet high, which is the most prominent in the vicinity and obscures the village from the SW.

Kupapau Point is prominent 17 miles SW of Cape Kumuhaki. **Apua Point**, 27 miles SW of the cape, is low and bare; shallow water extends 300 yards or more offshore. **Keauhou Point**, 2 miles W of Apua Point, is another prominent feature.

From 3 miles SW of Kupapau Point to Keauhou Point, the coastal plain and the lower slopes of the mountains are devoid of vegetation; higher up the mountains are wooded. Beginning 2 miles W of Kupapau Point is a series of bluffs several hundred feet high and 1 to 3 miles back of the shore. The bluffs are marked by numerous lava flows. The crater of **Kilauea** cannot be seen from seaward, but its location, when active, is indicated in daytime by the smoke that it discharges and at night by the glare on the clouds.

At Keauhou Point the bluffs are yellow, steeper, and near the beach. The plain at the foot of the bluffs is low, and on a dark night the beach is hard to see. A small shallow bay just W of Keauhou Point is the only area between Pohoiki and Punaluu that offers small craft protection from the seas; it offers little protection from the winds. **Keauhou Landing** is along the shallow bay just W of Keauhou Point. When entering the bay, favor the W shore to avoid a reef, covered 2 feet, in the entrance. The reported depth in the entrance channel along the W shore is 6 feet. An anchorage, with a restricted swinging area and a reported depth of 9 feet, is inside the reef in the entrance. **Puu Kapukapu**, about 2 miles W of Keauhou Point, is a yellow bluff about 1,053 feet high at its NE end. This bluff is the most prominent landmark near the beach on this part of the coast.

About 1.5 miles W of Keauhou Point is **Keaoi Island**, which is low, close inshore, and separated from the mainland at its E extremity only by shoal water. Small boats find shelter behind this islet by entering from the W.

Kau Desert, the country S of Kilauea volcano, is devoid of vegetation. The **Great Crack**, on the W side of the 1823 lava flow from Mauna Loa, marks the W limits of the desert. The Great Crack, which is visible from seaward, passes along the E side of **Puu Ulaula**. The hill is 1.5 miles inland and 994 feet high. A sharply defined, low, black cone is about 5 miles inland and on the E side of the lava flow at an elevation of about 1,800 feet. A prominent fence, which extends from just E of Puu Ulaula to the shore 8 miles W of Puu Kapukapu, marks the W edge of Hawaii Volcanoes National Park.

Pahala, 3 miles inland, is 42 miles SW of Cape Kumukahi and 21 miles NE of Ka Lae. A tall mill stack is prominent.

The country between the Great Crack and Punaluu is covered with sugarcane to an elevation of about 2,000 feet; thence the slopes are wooded to within about 6,000 feet of the summit of Mauna Loa. Here and there, bare lava flows cut up the canefields. Cane in the Kau District extends as far W as Waiohinu.

Chart 19322.–Punaluu, 17 miles NE from Ka Lae, was formerly the shipping point for Pahala, but the landing is no longer used. Small boats find some protection in depths of 6 to 11 feet close to the E shore of the small bight which forms **Punaluu Harbor**. The landing at the head of the bight is marked by the ruins of a warehouse. Resort cottages with distinctive native roofs can be seen NW of the landing; a prominent church, with a steeple, is 0.3 mile S.

The SW part of the bight is foul. A rock, awash at half tide, is 260 yards SSE of the landing; another, with 8 feet of water over it, is 40 yards farther offshore in the same direction. The entrance is between these rocks and the shore to the N. A rock, with 3 feet of water over it, is 0.2 mile E of the entrance and 80 yards offshore. The NE trades tend to haul more offshore in the vicinity of Punaluu Harbor, but in rough weather breakers extend completely across the entrance and passage is impossible.

Chart 19320.–The church and houses of **Hilea**, 1.7 miles W of Punaluu and 1.5 miles inland, can be seen from seaward. Back of the landing at Punaluu, and up to an elevation of about 3,500 feet, the slopes are broken; above this they appear regular and gradual to the summit of Mauna Loa. The upper slopes of Mauna Loa can only be seen from several miles offshore.

Puu Enuhe, 3 miles NW of Punaluu, is the seaward end of **Enuhe Ridge**. The butte is a conspicuous flat-topped cone with an elevation of 2,327 feet. **Kaiholena, Pakua**, and **Makanau** are promontories on **Kaiholena Ridge**, which extends 3 miles NW from the village of Hilea. **Ninole Gulch** lies between the two ridges, making the region extremely rugged, with the buttes standing out boldly. The buttes are prominent from either the SW or NE.

Kaumaikeohu Peak, about 5 miles N of Punaluu, is a prominent cone, 3,430 feet high, on the SE boundary of the Kau Forest Reserve.

Between Punaluu Harbor and Honuapo Bay, the shore is composed of masses of black lava rock which project out into deep water. About 1 and 3 miles SW of Punaluu are two conspicuous lava flows which reach the shore. Some of the slopes back of Honuapo Bay are covered with cane.

Chart 19322.–Honuapo Bay is a slight coastal indentation 13 miles NE of Ka Lae. Most prominent from offshore is the 236-foot cliff 0.5 mile SW of the bay; the upper half of the cliff shows black against the light-brown background of the hills, and the lower half is a grass-covered slide. The Honuapo pier is in ruins. The bay offers good anchorage in about 20 fathoms for deep-draft vessels. The bay is exposed to the trades and offers little protection for small craft.

Chart 19320.–Naalehu, 11 miles NE of Ka Lae and 2 miles inland, is on the S side of the base of **Puu Hoomaha,** which is 2,109 feet high. The country between Naalehu and Ka Lae is a grassy plain on which cattle range.

Manianie Pali begins at **Kimo Point,** 11 miles NE of Ka Lae, and ends at **Waikapuna Bay,** 9 miles from Ka Lae; the black coastal cliff is 100 to 200 feet high and has a band of yellow clay on top. From Waikapuna Bay to Kamilo Point, the coast is low and rocky.

Kamilo Point, 6 miles NE of Ka Lae, is a low, dark, lava mass on which is a black lava monument with a square base. A reef over which the sea generally breaks extends about 0.3 mile from the point.

Kaalualu Bay, 1 mile W of Kamilo Point, affords good shelter for small craft during NE trades, but is exposed during kona weather. Anchorage can be found in depths of about 10 fathoms 200 yards due W of the point on the E side of the entrance. The submerged coral reefs between the anchorage and the NE part of the bay should be avoided, especially during periods of heavy swells.

Between Kaalualu Bay and Ka Lae, the grassy plain is occasionally broken by bare lava. About 2.5 miles SW of Kaalualu Bay, the low coastline is broken by a grayish cinder cone.

Kaulana Bay, 0.9 mile NE of Ka Lae, is a small bay that offers excellent protection from the trades. It is best approached from SW to avoid the submerged rocks extending offshore from a lava flow spit that makes up the E shore of the bay. A boat ramp, used by local fishermen, is on the N shore of the bay.

Ka Lae (South Cape) is the S extremity of Hawaii Island. **Ka Lae Light** (18°54.9'N., 155°41.1'W.), 60 feet above the water, is shown from a 32-foot white pole with a red and white diamond-shaped daymark on the outer end of the cape. The SE side of the point is low; the bluff on the W side rises gently from the point to a height of 335 feet, 2 miles to the N. The bluff then leaves the shore and trends inland for several miles, increasing in height and forming the **Pali o Mamalu,** a remarkable cliff when seen from the W. Shoal water extends 0.6 mile S of the point; all vessels should keep 1 mile off to avoid possible dangers. The shore current setting NE against the trade wind frequently produces a rough sea on the E side of the cape. Offshore the current sets SW.

From Ka Lae to Upolu Point, a distance of about 95 miles, the coast has a general N trend and is mostly bold. The largest reef extends about 0.6 mile from shore in Kawaihae Bay; few of the others off the numerous capes and points make out more than 0.3 mile. All dangers can be avoided by staying at least 1 mile offshore.

Honokohau Small-Boat Harbor and **Kawaihae** are the only sheltered harbors along the W coast of Hawaii; all others are smooth during regular NE trades, but are exposed during kona weather. The trade winds draw around Ka Lae and hold N offshore for about 3 miles, generally causing a rough sea from Ka Lae to Kauna Point. At Kauna Point, the complexion of the sea changes abruptly, the sea being considerably smoother to the N.

Storms from the SW to NW are most frequent in January and February. Some protection for small craft may be found in Keauhou, Honokohau, and Kawaihae Bays, but anchorage space is limited. Boats sometimes seek shelter along the SE side of the island during these storms.

Gasoline and a limited supply of water are available at Keauhou, Kailua Kona, and Kawaihae along the W coast. Supplies are mostly obtained from the stores on the main highway inland from the coast.

The section of the W coast between Ka Lae and Kawaihae Bay, 79 miles N, is known as the **Kona Coast.** The country along this coast is broken up by numerous lava flows, varying in length from a few hundred yards to 30 miles, that have broken out from Mauna Loa and Hualalai. Between these flows are areas that are heavily wooded and covered with vegetation above an elevation of 1,500 feet, and there are large areas planted in coffee. Many of the lava flows reach the coast and terminate in bluffs, some fairly high and others only a few feet above the water. Scattered trees and bushes can be seen between many of the flows.

From Pali o Mamalu to Hanamalo Point, about 16 miles NW, are lowlands several miles wide, which rise gradually to the mountains. The country is extremely desolate, with its grayish-black slopes of bare lava. A particularly black flow lies at the base of the lighter colored cliffs of Pali o Mamalu.

At an elevation of 2,000 feet the kona region is known for its cool and bracing climate and plentiful rain. Little variation in weather is experienced; there is generally a land and sea breeze, except during kona winds. This condition, however, does not apply between Kawaihae Bay and Upolu Point, since the region is affected by the winds which draw across the island.

Waiahukini, a small fishing village at the base of **Pali o Kulani,** is marked by a patch of white sand. **Kaliikii Shoal** extends about 0.5 mile offshore to the W and N of the landing.

Puu Hou, a black, well-defined cone 273 feet high, is close to the beach 1.6 miles NW of Waiahukini.

Pohue Bay, 9 miles NW of Ka Lae, has a sand beach at its head where landings can be made.

Na Puu a Pele are cones near the beach 12 miles NW of Ka Lae. The cones are prominent landmarks, and at the summit of the highest is a black stone cairn.

Kauna Point, 13.5 miles NW of Ka Lae, is low, flat, and somewhat grassy, with a small hummock of graying lava 0.5 mile inland. The concrete base of a former light, nearly flush with the ground, is visible on the point.

Kamoi Point, 16.3 miles NW of Ka Lae, is a low jumble of lava rock. A small bight, S of the point, has a sand beach at its NE extremity where small boats can land. A small shack and a skeleton tower at the head of the bight are conspicuous from seaward.

Kanewaa Point is 18.5 miles NW of Ka Lae.

Okoe is at the head of **Okoe Bay,** a cove immediately S of Hanamalo Point. The cove indents the shore more than any other in the vicinity and has a little more sand on the beach. Anchorage can be found in depths of 7 to 15 fathoms. Larger vessels can anchor in 20 fathoms by entering the bay from due W and dropping anchor with Milolii Point Light bearing 022°.

Hanamalo Point, 21 miles NW of Ka Lae, is a low mass of lava with no prominent features. Unless close inshore, the point is difficult to distinguish from other points in the vicinity. S of Hanamalo Point, an inshore current sets S around Ka Lae and thence NE along the shore to the vicinity of Keauhou Point.

Milolii Point Light (19°11.4'N., 155°54.6'W.), 44 feet above the water, is shown from a 20-foot concrete tower with a red and white diamond-shaped daymark.

Milolii, a village 2 miles N of Hanamalo Point, has a concrete boat landing. The landing has a depth of 7 feet alongside. The current off the landing has a prevailing N set which sometimes reaches a velocity of 2 knots. A dangerous reef extends about 400 yards offshore at the S end of the village.

An abandoned schoolhouse, visible only from the NW, is in the ironwood grove 250 yards S of the Milolii landing. Between the school and the landing is a grove of coconut trees, back of which are the 15 or 20 houses of the village. Otherwise, the countryside is a barren mass of lava. There is no protected anchorage off the landing. Storms occur most frequently in January and February.

The lava flow of 1926 from the slopes of **Puu o Keokeo** entirely destroyed the village of **Hoopuloa,** 1 mile N of Milolii. The same flow nearly engulfed Milolii.

Papa Bay, 3 miles N of Milolii, is a coastal indentation to the S of a prominent black lava flow of 1919. The ruins of an ancient Hawaiian civilization are at the N end of the bay.

Three lava flows of 1950 are prominent 4.3, 7.7, and 9.3 miles N of Milolii Point Light. These flows emanating from the SW rift zone of Mauna Loa extend into the sea, forming precipitous cliffs.

Auau Point, 8.6 miles N of Hanamalo Point, is the crescent-shaped rim of an old crater that has had its seaward face blown out.

Lepeamoa Rock, 11 miles N of Hanamalo Point, is close offshore from the island. The rock, 95 feet high, is the crescent-shaped rim of an old crater that has had its seaward face blown out. About 1.5 miles inland from the rock is the 1,766-foot peak of **Haleili.** Small villages of a few houses each are scattered along the coast, 1 or 2 miles apart, between Milolii and Lepeamoa Rock. The highway, which is 2 miles inland at Milolli, draws nearer the coast until at Lepeamoa Rock it is only 0.5 mile inland.

Kauhako Bay, 34 miles NW of Ka Lae, is a small cove which has at its head a pali, or cliff, about 0.5 mile long and 120 feet high. **Hookena** is a small village at the foot of the N end of the pali. A prominent landmark is a stone church, with steeple, at the N end of the village. A large grove of coconut and shade trees is near the village. Anchorage can be found in depths of 15 fathoms, sandy bottom, about 300 yards off Hookena. There is a landing near the N end of the sand beach.

The bluffs along the coast N of Hookena lose their height. The slope up to the interior is not so steep as to the S, and the country is covered with brush and coffee plantations.

Loa Point, about 35.5 miles NW of Ka Lae, is flat and low, and green to within 40 yards of the water, then rocky.

Between Loa Point and Hookena is the settlement of **Kealia,** which is at the N end of a long pebble beach. The villages along this section of the coast usually have a few houses on the beach, but most of the houses are on the highway 1 or 2 miles inland.

Chart 19332.–Honaunau Bay, 37 miles NW of Ka Lae, indents the coast about 500 yards and is about 500 yards in width. The bay lies between two flat lava points. **Puuhonua Point,** on the S, is lower and smaller and is marked by the 12-foot-high stone walls of the **City of Refuge** and by a grove of tall coconut trees. The City of Refuge is of historic interest and is now maintained as a National Historical Park of about 182 acres. In former times, criminals or refugees reaching the place were safe until such a time as the king of the land took action. Vessels anchor in depths of 4 to 8 fathoms 150 yards from the S shore. Small boats can easily land on the shingle beach on the SE side of the bay during normal weather.

Palemano Point, on the S side of the entrance to Kealakekua Bay, is low and flat, with scattered coconut trees and temple ruins near its outer end. The buildings of a resort camp on the point are prominent. A mass of bare rocks extends 125 yards off the N side of the point. About 0.4 mile N of the point, an old lava flow reaches the shore.

Kealakekua Bay, 40 miles NW of Ka Lae, is marked on its N side by a light on Cook Point. The bay is about 2 miles wide between Palemano Point and Keawekaheka Point, and indents the coast about 1 mile. The shore is low, except on the NE side where a precipitous cliff between 400 and 600 feet high extends about 0.5 mile. A narrow reef fringes the shore between the S end of the cliff and Palemano Point. The bay is free of obstructions, affords good anchorage in all but strong SW winds, and is by far the best anchorage along this coast. In choosing an anchorage it is well to remember that in the daytime a sea breeze will prevail, shifting to a land breeze at night. The bottom is of coral and sand and is only fair holding ground.

Kaawaloa Cove is the N part of Kealakekua Bay and lies between the high cliff and Cook Point. It was here that Captain James Cook was killed by the natives in 1779. **Cook's Monument** is a concrete shaft, 25 feet high, near the shore of the inner side of Cook Point. A concrete landing, with a depth of about 6 feet alongside, affords a means for visitors to reach the monument. Kaawaloa Cove is within the boundary of Kealakekua Bay Marine Life Conservation District and Underwater Park. State regulations forbid anchoring, except in an emergency, and overnight mooring at other than designated locations within the park boundaries. A copy of the regulations can be obtained from the office of the harbormaster at Hilo.

The village of **Napoopoo** consists of a few houses scattered among the coconut trees just S of the cliff. Water and provisions are scarce. The landing, which has a depth of about 4 feet alongside, is in the middle of the village. During a heavy swell it is best to land on the sand beach at the N end of the village. A church spire is fairly prominent from offshore.

Keawekaheka Point, on the N side of the entrance to Kealakekua Bay, is a low, bare, lava point. An extensive lava flow reaches from the point to the high cliff at the head of the bay.

Chart 19327.–Puu Ohau, 1.5 miles N of Keawekaheka Point, is a green cone, 231 feet high, near the beach. The cone has a blowhole in the middle, and its seaward side is blown out, forming a red cliff.

Keikiwaha Point, 2 miles N of Keawekaheka Point, is low, black, and jagged, with coconut trees on it. About 2 miles inland from the point, and on the highway, are a stack, a church, and the buildings of **Kainaliu.**

From Napoopoo to Kailua Kona is the most thickly settled section of the coast; cultivated fields of coffee extend both ways from the highway that parallels the shore 1 to 2 miles inland.

Kaukalaelae Point, 4.4 miles N of Keawekaheka Point, is low and flat. The white hotel on the point is one of the most prominent landmarks along this coast.

Keauhou Bay, 45 miles NW of Ka Lae, indents the coast 0.3 mile and is 300 yards wide between entrance points. The bay is between two lava flows at the foot of a gentle slope and, though small, is one of the best protected along the kona coast. **Keauhou Bay Light** (19°33.9'N., 155°57.9'W.), 35 feet above the water, is shown from a 30-foot pole on shore at the head of the bay. A three-color directional light is shown 10 feet below on the same structure; the fixed white sector of the beam marks the centerline of the entrance channel on course **066°**. The channel is also marked by an unlighted range, the rear marker of which is on the same structure as the lights. The **Keauhou** schoolhouse on the highway 1.5 miles inland is fairly prominent from offshore. The bottom is extremely irregular and has many coral heads with depths of 5 to 6 feet over them. A reef extends 100 yards off the N entrance point. By maintaining a lookout for coral heads, boats of 4-foot draft can enter the bay for anchorage. Breakers frequently extend across the mouth of the bay. A 3-ton hoist is on the pier; fuel and a limited amount of water are available. A marine railway can handle craft up to 45 feet.

Kahaluu is a small village about 1 mile N of Keauhou.

Hualalai, in the central W part of the island, is a conical peak 8,269 feet high, covered with vegetation to its summit and prominent from any point of approach. Its W slopes terminate in a bare lava plain about 4 miles wide. The plain forms a low beach consisting of sand in some places and lava rocks in others.

Chart 19331.–Kailua Bay, 50 miles NW of Ka Lae, is a dent in the coast at the S end of the flat plain which extends N to Kawaihae Bay.

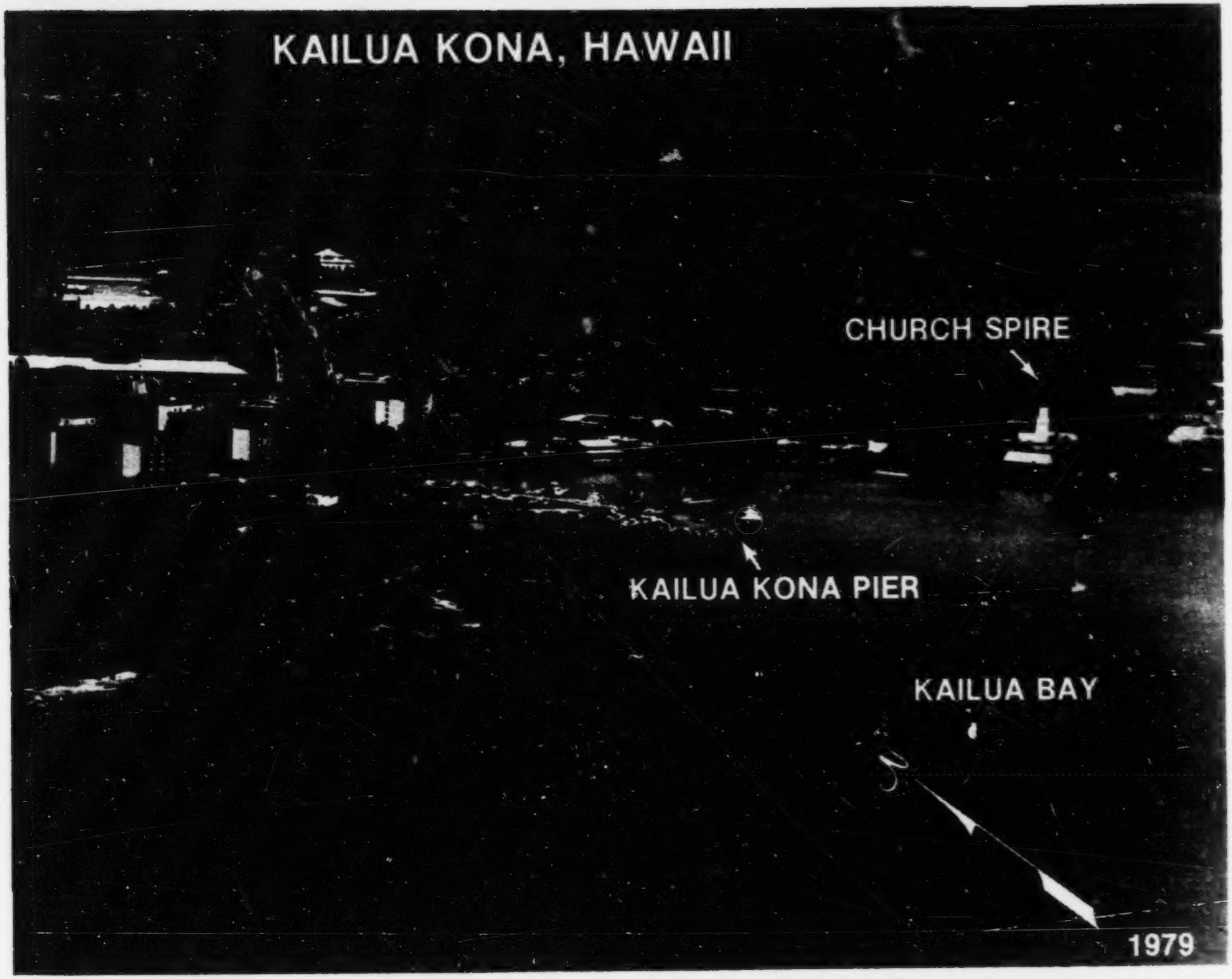
Kailua Kona, on the N side of the bay, formerly a barge terminal, is now used by cruise and charter boats and is the home of a sport-fishing fleet. Large ships anchor offshore and ships' tenders are used for transportation to shore. **Kailua Light** (19°38.5'N., 156°00.2'W.), 32 feet above the water, is shown from a white pyramidal concrete tower on **Kukailimoku Point,** which is on the NW side of the bay entrance. Also prominent is the church spire E of Kailua Kona pier.

No breakwater protects this small exposed harbor. Access is good, and no channel is required to reach open water. The turning basin E of the pier is 12 to 20 feet deep and about 500 feet square. The W side of the pier has a surfaced boat-launching ramp. Gasoline, water, and marine supplies are available in limited quantities. A wharfinger is present on weekdays from 0630 to 1730 and can assist in arranging delivery of other petroleum products by tank truck. He also serves as the wharfinger for the Honokohau small-boat harbor.

Storm warning signals are displayed. (See chart.)

Chart 19327. –The coast between Kailua Bay and Kawaihae Bay is a black, jagged mass of lava. The numerous capes and indentations are caused by the lava flows over the level country. Between Keahole and Upolu Points, the trade winds draw over the mountains, at times causing a very strong offshore wind. Vessels anchoring in this vicinity should be prepared to use both anchors, as the prevailing N current prevents laying to the wind.

Kaiwi Point, about 2 miles NW of Kailua Kona,


KAILUA KONA, HAWAII
CHURCH SPIRE
KAILUA KONA PIER
KAILUA BAY
1979

383

BEST DOCUMENT AVAILABLE

is low and black, with some small patches of white sand. Shoal water extends about 0.3 mile offshore on the S side of the point, but on the W side the 100-fathom curve is only 0.3 mile offshore.

Honokohau Small-Boat Harbor, at the head of **Honokohau Bay,** about 1 mile N of Kaiwi Point, is entered through a marked dredged channel that leads to two basins in the harbor. In May 1980, the controlling depths were 15 feet from the bay to Light 4, thence 10 feet to and in the channel along the N side of the harbor, thence 12 feet in the W basin, except for lesser depths along the E edge, and 7 feet in the W part of the E basin. In June 1981, depths of 6 to 10 feet were reported in the E part of the E basin. Two boat-launching ramps, a haul-out ramp, and berthing are available. The wharfinger is located at the Kailua Kona pier.

Keahole Point, 57 miles NW of Ka Lae, is the W extremity of Hawaii Island. **Keahole Point Light** (19°43.9'N., 156°03.8'W.), 43 feet above the water, is shown from a 33-foot white pyramidal concrete tower. An aerobeacon atop the 65-foot control tower, 1.2 miles ENE of Keahole Point Light, is more prominent at night than Keahole Point Light. The point is low and well defined, and consists of black lava with some small vegetation. White patches of sand may be seen between the fingers of the lava. A N current sets past Keahole Point. Frequently there are small tide rips near the point, and 2 miles to the N the rips are violent when the NE trade winds are strong. A berth of 0.5 mile clears the point in deep water.

Puu Waawaa (see chart 19320), 13 miles E of Keahole Point, is prominent and can often be seen when Hualalai is hidden by the clouds. The mountain, 3,971 feet high, is dome-shaped, with deep gorges on its side, and rises about 1,000 feet above the slope on which it stands.

Between **Makolea Point** and **Kawili Point,** 3 and 4 miles N of Keahole Point, shoal water extends about 0.7 mile offshore. The sand and coral bottom is plainly visible. A current sets NE along this coast, and there are tide rips off Makolea Point. Offshore, beyond the 2,000-fathom curve, the current has been observed to set E toward the coast. When a heavy swell is running, breakers extend about 0.5 mile offshore. Strangers should give these points a berth of 1.5 miles. The village of **Mahaiula** is at the head of the unimportant bay between the two points. Between Keahole and Mano Points are several small bays that are rarely used.

Kuili, 5 miles N of Keahole Point and 0.3 mile inland, is a brown crater 342 feet high. The hill marks the seaward end of a series of cones on the ridge extending from the NW slope of Hualalai. An extensive shoal extends about 0.5 mile offshore about 2 miles N of Kuili and between the villages of **Kukio** and **Kaupulehu.**

Mano Point, 9 miles NE of Keahole Point, is a poorly defined, rounded, flat mass of lava.

Kiholo Bay, 11 miles NE of Keahole Point, indents the coast 0.5 mile and is 1 mile wide. The head of the bay is foul, but local vessels have anchored close to the black lava shore on the S side. A SW current, with an average velocity of about 0.5 knot, has been observed in Kiholo Bay. The village of **Kiholo** consists of a few houses in a coconut grove at the head of the bay.

Puu Anahulu (see chart 19320), 4 miles E of Kiholo, is a prominent yellowish cone, 1,523 feet high, with lava flows on three sides.

Kapalaoa is a village on the S side of a small bight 3.5 miles NE of Kiholo. The bight is foul and can only be used by small boats with local knowledge.

An **Ocean Thermal Energy Conversion (OTEC) Site** is about 12 WNW of Mano Point. The site consists of a moored converted 520-foot blue and white tanker and various underwater apparatus. Mariners are requested to stay well clear, at least a 5-mile radius, of 19°56'25"N,, 156°09'48"W., because of the divers and underwater equipment operating in the area.

Charts 19330, 19327.–Puako Bay is a small indentation in the coast 20 miles NE of Keahole Point. There is no protection for large vessels, and very little is available for small craft. The bay is open to W and NW winds and is foul with coral heads and reefs. The shores are mostly black, smooth lava extending into the water on a gentle slope, with many detached rocks of the same material. A small landing is at **Puako,** on the SE side of the bay, and many houses are along the S shore.

Small boats can approach the landing on a course of 137° until within 250 yards of it, where the channel is marked by private buoys; a private light is on shore near the landing. A reef off **Waima Point,** 1 mile SW of Puako, is easily recognized from a safe distance offshore. Anchorage can be found about 0.8 mile NW of Puako in depths of 12 to 15 fathoms, sand and coral bottom.

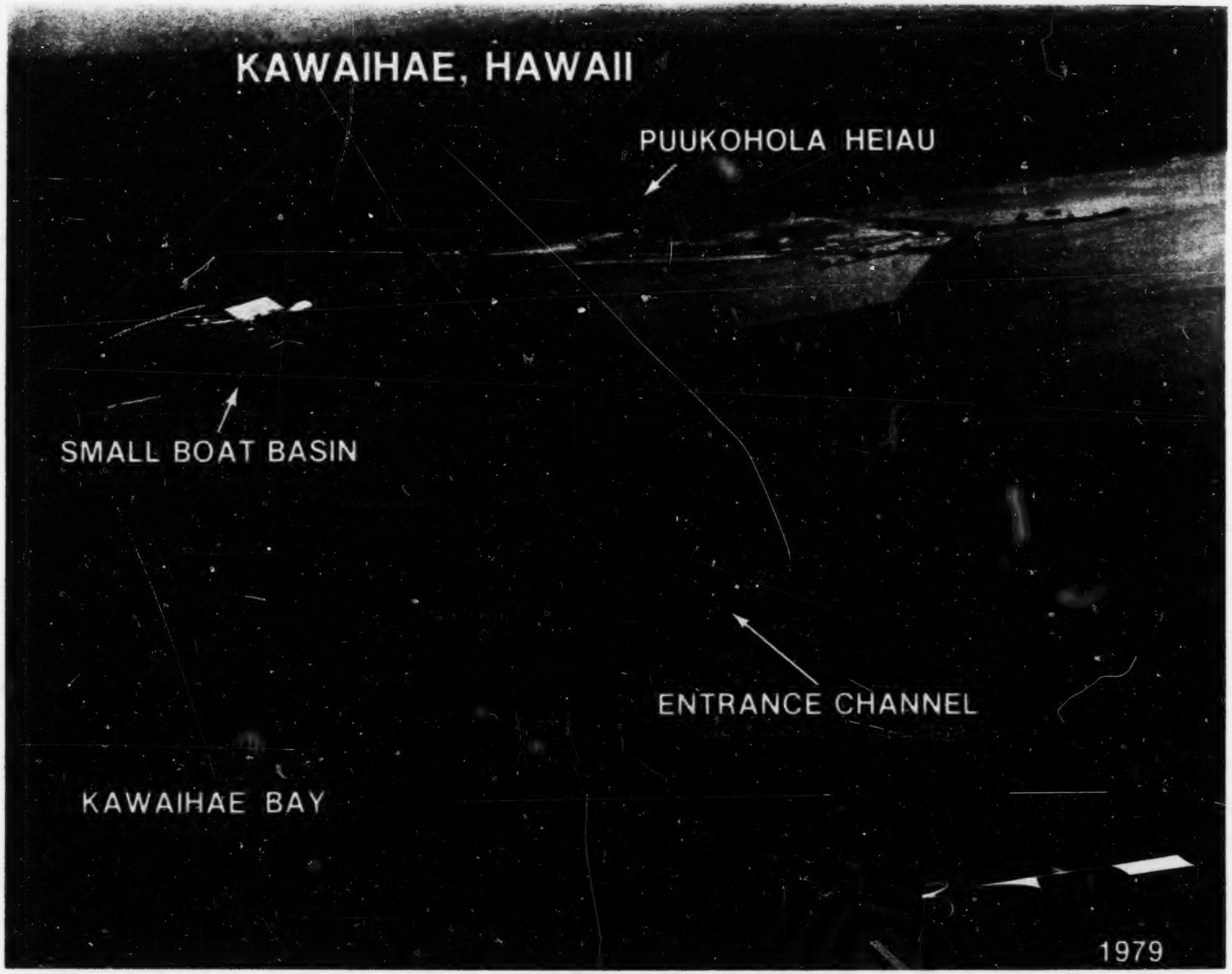
A large hotel and golf course can be seen at **Kaunaoa Beach,** 2.7 miles NE of Waima Point. A cluster of three tanks, about 0.6 mile S of the hotel, is also prominent.

The coast, which has a NE trend to Puako, turns N for 3 miles, then gradually recurves to the NW, forming **Kawaihae Bay.** The black lava flows are no longer characteristic, and the back country, with its extensive slopes, is some of the best grazing land in the State.

Kawaihae, 3.5 miles N of Puako, is a commercial deepwater harbor in the N part of Kawaihae Bay. The harbor is protected by stone revetment and fill on the S and by a breakwater on the W; the entrance is from NW.

Prominent features. –Kawaihae Light (20°02.7'N., 155°50.1'W.), 59 feet above the water, is shown from a 36-foot white pyramidal concrete tower on the NW side of Kawaihae. Deep and heavily wooded **Honokoa Gulch** is NW of the harbor, and **Puukohola Heiau** is a square of dark rocks on a 50-foot knoll SE of the breakwater. **Puu Kamalii,** a mile NE of Kawaihae, is 690 feet high and fairly conspicuous.

COLREGS Demarcation Lines.–The lines estab-


KAWAIHAE, HAWAII
PUUKOHOLA HEIAU
SMALL BOAT BASIN
ENTRANCE CHANNEL
KAWAIHAE BAY
1979

385

BEST DOCUMENT AVAILABLE

lished for Kawaihae Harbor are described in 80.1470, chapter 2.

Channels.–Federal project depths are 40 feet for the entrance channel and 35 feet for the main basin behind the breakwater. (See Notice to Mariners and latest edition of the chart for controlling depths.) A lighted **120°** entrance range and lighted and unlighted buoys mark the channel. A small boat basin, just N of the main basin, had a controlling depth of 10 feet in January 1973.

Anchorages.–Good anchorage, except in kona weather, may be found in depths of 8 to 15 fathoms between Honokoa Gulch and the outer end of the entrance channel.

Dangers.–Reefs that bare in places extend as much as 0.5 mile from the outer side of the breakwater and from the shore to the S.

An unlighted mooring buoy is in about the middle of the harbor. Large ships when moored run a cable to the buoy which is not always visible above water. Mariners are advised to use extreme caution when transiting this area, especially at night.

Tides and currents.–The mean range of tide is 1.3 feet and the diurnal range of tide is 2.0 feet at Kawaihae. The strong N current felt off Keahole Point and Makolea Point passes offshore at Kawaihae, where there is practically no current.

Weather.–Subject has been discussed on previous pages, but vessels maneuvering in Kawaihae Harbor are again warned to be on the alert for sudden strong offshore gusts caused by the trade winds drawing over the mountains.

Pilotage.–This is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade with a Federal licensed pilot on board.

The pilot boat is a 17-foot whaler with a white hull. The boat displays the International Code flag "H". The pilot boarding station is about 1 mile seaward of the breakwater on the entrance channel rangeline. The pilots monitor and use as a working frequency VHF-FM channel 12 (156.60 MHz). Mariners are requested to give at least 24 hours advance notice of arrival and gross tonnage, length, and draft of vessel; telephone (808-537-4169). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots.

Towage.–Tug service must be arranged for in advance; there are no tugs available in the harbor.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Harbor regulations.–These are established by the Harbors Division of the Hawaii Department of Transportation and are enforced by the **harbormaster.**

Wharves.–The State-owned waterfront facilities are on the NE side of the harbor basin. General cargo is usually handled by ships' tackle, and cargo to and from barges by forklift trucks. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Interisland Terminal Barge Wharf: Just inside harbor basin; 410-foot face, 16 to 25 feet reported alongside; deck height, 8 feet; 13,000 square feet of covered storage; cattle holding pens and loading chute; receipt and shipment of general and containerized cargo by barge; receipt of bulk cement and lumber; shipment of cattle and produce; operated by Young Brothers, Ltd.

Overseas Terminal Wharf: 200 yards SE of barge wharf; 605-foot face; 35 feet reported alongside; deck height, 8 feet; 20,000 square feet covered storage; pipelines to petroleum and molasses storage tanks; traveling bulk sugar loading tower with conveyors, loading rate 500 to 600 tons per hour; receipt and shipment of general cargo; shipment of bulk raw sugar, molasses, and lava cinders; receipt of petroleum products and bulk fertilizers; operated by Kawaihae Terminal, Inc.

A 100-foot-wide concrete ramp with mooring dolphins, used exclusively for handling military cargo to and from U.S. Government-owned landing craft, is at the SW end of the harbor.

Supplies.–Water and limited amounts of fuel oil and diesel oil are available.

Communications.–Kawaihae has interisland barge and air service and is a port of call for transpacific vessels.

Chart 19327.–Between Kawaihae and Mahukona, the country is uncultivated grazing land. Mountain slopes terminate in cliffs at the coast and are cut intermittently by ravines.

Chart 19329.–**Mahukona Harbor** is a small, open bight 10 miles NW of Kawaihae and 6 miles SW of Upolu Point. The village of **Mahukona** consists of a few houses in an algaroba grove near the beach, and abandoned warehouses and oil tanks. The shore is rocky, and the slopes back of the village are partially covered with algaroba trees.

Mahukona Light (20°11.0'N., 155°54.3'W.), 64 feet above the water, is shown from a 22-foot white pyramidal concrete tower on Kaoma Point, S of the village.

Magnetic disturbance.–Differences of as much as 3° from normal variation have been observed in the vicinity of Kauili Point about 0.7 mile N of Mahukona.

Anchorage may be selected 0.2 mile SW of Makaohule Point, in depths of 10 to 15 fathoms, sand and coral bottom. An anchorage with less wind can be found 0.3 mile NW of the point and about 400 yards off the beach.

Reports indicate that the inshore current usually sets N with considerable velocity. However, during the period of current observations the average N drift was about 0.2 knot, both N and S velocities of nearly 1 knot were measured, and the tidal current averaged less than 0.2 knot at strength. During the observations, winds were light to moderate and variable in direction. Strong offshore winds, accompanied by violent gusts from varying directions, are frequently experienced during the normal NE trades. Because of these conditions, vessels should anchor with plenty of cable and have a second anchor ready to let go.

The public landing is at the head of the bight and a private landing is on the N shore. Both landings are for small boats only. Provisions are available.

Chart 19327.–The coast between Mahukona and Upolu Point is a series of low, black bluffs. Back of the bluffs, the country is marked by numerous old blowholes and rises gently to the Kohala Mountains. The cuts and fills of the railroad that formerly skirted the coast from Mahukona to Kohala may be seen when close inshore.

Chart 19320.–Alenuihaha Channel, between the islands of Hawaii and Maui, is 26 miles wide in its narrowest part, between Upolu Point and Puhilele Point. The channel is free of obstructions and is deep close to the shores.

Strong trade winds usually prevail, causing the channel to be very rough and a current of 1 to 2 knots to set W. Passage is very difficult for smaller vessels, especially when going E. During the calms that frequently follow, there is at times an E set of about 1 knot, and during kona winds the E set may reach a velocity of 2 or 3 knots. The channel is roughest and the W current strongest when the wind is between NNE and ENE. During periods of strong NE trades, violent tide rips may be encountered 2 miles N of Keahole Point, probably caused by the meeting of the SW offshore current with the N inshore current. When bound from Upolu Point to Alalakeiki Channel, an onshore set is sometimes felt when reaching the lee of Maui.

Chart 19340.–Maui Island, 26 miles NW of Hawaii Island, has an area of 728 square statute miles and is second in size of the eight large islands. The island is 42 miles long in a NW-SE direction and 23 miles in greatest width. A low, flat isthmus joins the two distinct mountain masses that make up the island. The crater of **Haleakala** (house of the sun), 10,025 feet high, is near the center of the E and larger part of the island. On the NW side of the crater the land slopes gently, while on the S and E sides, it is much steeper and in some places precipitous. **Koolau Gap** on the N side, and **Kaupo Gap** on the SE side, are two large openings in the side of the crater. **Puu Kukui,** 5,788 feet high, is near the center of the W and smaller part of the island, which is cut up by rugged peaks and deep valleys and gulches.

Anchorages are numerous on the SW side of Maui; the first requirement under ordinary conditions is shelter from the trade winds.

Currents.–In the vicinity of Maui, currents are variable, depending to a great extent upon the velocity and direction of the wind. Usually there is a W flow in the offshore areas along the N and S coasts, which is part of the general W oceanic drift accompanying the prevailing NE trade winds. Much of the flow along the S coast appears to continue W past the S coast of Kahoolawe. Weak, variable currents are reported in Alalakeiki Channel, and there is a N flow in Auau Channel. Near the shores of the island the currents are complicated by tidal effects, wind, and counter currents.

Weather.–The trade winds divide at Kauiki Head, one part following the trend of the coast NW and the other part following the S coast. The winds following the NW coast divide again at the isthmus, one part drawing S and often reaching great force in the vicinity of Maalaea Bay, and the other part following the trend of the coast around the NW end of Maui and through Pailolo Channel, with the greater force on the Molokai side of the channel. That part of the trades following the trend of the S coast of Maui divides, with part continuing along the S shore of Kahoolawe and the other part drawing through Alalakeiki Channel, around the N end of Kahoolawe and W through Kealaikahiki Channel.

On the S coast of Maui, a sea breeze frequently sets in about 0900 and continues until after sundown, when the land breeze springs up. Light airs or calms are generally found in the vicinity of Molokini Islet and again along the W shore of Maui between Hekili and Kekaa Points. In the vicinity of Lahaina a light onshore breeze is generally felt, while farther out in Auau Channel the NE trades are noticed.

Rainfall is quite heavy on the windward side of the island and light on the lee side.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Supplies.–Marine supplies are available in limited quantities for small craft at Kahului, Wailuku, Lahaina, and Maalaea. Fuel and water are available at Kahului, Maalaea, and Lahaina.

Repairs.–Some machine repairs can be made at Kahului. Minor repairs of small craft can be accomplished at Maalaea.

Communications.–Maui has telephone communication with the other islands and with the mainland. Passenger and freight service travels over good to fair highways that extend to most parts of the island. Kahului is a port of call for interisland and transpacific shipping. The island has regular scheduled air service.

From Hana Bay to Cape Hanamanioa, the coast has a generally WSW trend. Between Hana Bay and Nuu Landing the coast consists of high, rough bluffs, broken up by numerous small capes and indentations. Vegetation may be seen as far as Kaupo Gap. The entire S face of Haleakala is steep and eroded, presenting a reddish-brown appearance, dotted here and there with green patches.

The slopes become less steep as the shore is approached. From Nuu Landing to Cape Hanamanioa the coast is bare, with practically no sign of habitation. Dangers lie offshore in the vicinity of Alau Island, Ahole Rock, and between Pohakueaea Point and Cape Hanamanioa. Otherwise, the 10-fathom curve lies within 0.2 mile of the shore. Landings can be made during trade-wind weather in the numerous coves along the coast between Muolea Point and Nuu Landing. There are no suitable anchorages between Nuu Landing and Cape Hanamanioa.

Chart 19341.–Hana Bay lies between Kauiki Head and Nanualele Point at the E end of Maui. The bay is about 0.4 mile in diameter and is open to the E. **Hana** is on the S side of the bay.

Kauiki Head, on the S side of Hana Bay entrance, is a crater 390 feet high; the outer half of the crater has eroded, leaving the inner side exposed. Because it is joined to the rest of Maui by a comparatively low neck of land, Kauiki Head has the appearance from a distance of a separate island. **Kauiki Head Light** (20°45.6'N., 155°58.9'W.), 85 feet above the water, is shown from a 14-foot white pyramidal concrete tower on an islet close to the NE side of the crater.

The shores of Hana Bay are rocky except for two short beaches, one at the S end of the bay and the other on the NW side. A shoal, usually marked by breakers, extends halfway across the bay from the middle of the N shore. A small 16-foot rocky spot is 350 yards N of the light. Numerous rocks, some bare at all tides, extend for 200 yards off **Nanualele Point.** The point is low, flat lava on the N side of Hana Bay. **Twin Rocks** are two bare rocks, with deep water close-to, about 300 yards NE of the light; the inner and larger rock is 15 feet high. About 200 yards S and 300 yards SE of outer Twin Rock are **Inner Pinnacle Rock,** about 3 feet high, and **Outer Pinnacle Rock,** about 5 feet high.

The entrance channel to Hana Bay is between Twin Rocks and the 16-foot shoal. A private unlighted **241°15'** range marks the channel. A local rule is to avoid entering the harbor when the seas are breaking at the entrance.

The bay does not afford a desirable anchorage. Small vessels sometimes anchor in the SW portion of the bay, but swinging room is limited. Anchorages in the bay are exposed to NE winds and sea, and during strong SW blows vessels are apt to drag anchor. In the absence of local knowledge, anchorage should be attempted only by small craft.

Currents.–Just outside the bay a tidal current reaches its S strength when the tide at Honolulu is rising and its N strength when the Honolulu tide is falling. S and N velocities of about 1 knot and 1.5 knots, respectively, have been observed. Farther offshore, a strong N or NE current has been reported. Off Kauiki Head and Nanualele Point, rough seas occur when a NE wind blows against the NE current.

No breakwater protects this small, exposed harbor. The turning basin is 20 to 30 feet deep and about 600 feet by 800 feet. The State-owned T-pier provides 300 feet of berthing space, but is in poor condition and no longer maintained. Vessels drop anchor NW of the pier and make a starboard landing. Small boats can be launched from the sand beach at the S end of the bay.

Storm warning signals are displayed. (See chart.)

Chart 19340.–Puu o Kahaula, 545 feet high, is the highest of five hills 0.7 mile inland from Hana; the stone memorial cross atop the hill is sometimes lighted at night.

Alau Island, 1.5 miles S of Kauiki Head and 0.4 mile offshore, is 100 yards in diameter and 150 feet high, is grass covered and has a few coconut plams. Between the island and Maui is an extensive reef. Tidal currents of 0.5 knot, setting N and S, have been observed near Alau Island. Off the island is a strong NE current, and there is an eddy between the island and Kauiki Head.

Two rocks with about 9 feet of water over them are close together about 0.7 mile SE of Alau Island. Under favorable conditions, these rocks appear as small, yellowish-brown spots in the water. However, they are seldom seen and do not break in moderate seas. Vessels may avoid the rocks by giving Alau Island a berth of about 1.5 miles in passing.

Iwiopele, about 1.5 miles S of Hana Bay, is a formation similar to Kauiki Head and resembles the latter in size and appearance.

Mokae Cove, almost 1 mile S of Iwiopele, affords a landing for small boats in NE weather. S currents with velocities up to 0.5 knot have been observed 0.5 mile from the shore in this locality.

From **Makaalae Point,** 3 miles S of Kauiki Head, the coastal trend is SW. There are several villages between Mokae Cove and Wailua Cove. A church spire is prominent on the bluff at **Puuiki,** 3.5 miles SW from Kauiki Head.

Wailua Cove is at the mouth of a valley 5.5 miles SW from Kauiki Head. Inland from the cove and halfway up the mountain is a high waterfall that is usually conspicuous from offshore. A white cross, below the waterfall, is visible. Landings may be made during normal trade-wind weather in almost any of the coves along the coast, although the swell enters all of them. **Muolea Point,** a mile E of Wailua Cove, is rounded and rocky.

Kipahulu, 8 miles SW of Kauiki Head and 0.5 mile W of **Puhilele Point,** is a ranch settlement on the W side of deep **Kipahulu Valley;** a stack is prominent. **Ahole Rock,** about 0.3 mile off the shore below Kipahulu, is low and flat, and has a bare appearance; anchorage in the vicinity is not recommended.

Kaapahu Bay, 1.5 miles W of Kipahulu, is a small coastal dent which sometimes can be used for small-boat anchorage in trade-wind weather; there are depths of 4 fathoms about 200 yards off the pebble beach.

Kaupo Landing, 11 miles SW of Kauiki Head, is the best in the vicinity during trade-wind weather.

Adjacent land is divided into small homesteads, and cattle raising is the principal occupation. Vessels anchor well off and E of the landing. Strong E winds make landings difficult.

Kailio Point, 13 miles SW of Kauiki Head, is 73 feet high, narrow, and at the E end of **Mamalu Bay.** A prominent church is on the highway directly N of the point. Trade-wind anchorage may be found about 300 yards from the head of the bay in depths of 10 fathoms, sandy bottom.

Kaupo Gap is the large opening, about 1.3 miles wide, in the SE side of Haleakala Crater. An immense old lava flow slopes gradually from the gap to the coast. The wide U-shaped gap at the top is a good landmark, day or night, for Kailio Point. The brush-covered lava flow is the dividing line between the forest and brush of the E part and the barren W part of the S coast. Waterfalls are numerous E of the gap.

Low **Apole Point,** 15 miles SW of Kauiki Head, is composed of black, jagged rock. The point marks the seaward end of the Kaupo lava flow.

Nuu Landing is a small bight on the W side of Apole Point. Small vessels can find anchorage in depths of about 8 fathoms.

From Nuu Landing to **Pohakueaea Point,** 12 miles to the W, the coast is barren and deep water is close-to. All dangers are close to the bluffs. A few homesteads may be seen on the slopes that rise to the rim of Haleakala. The slopes are cut by gulches and are barren except for a scattering of trees about halfway up. At Pohakueaea Point, the 20-fathom curve begins to trend offshore.

A pinnacle rock with depths of less than 12 feet over it is reported to exist within 0.5 mile of the shore somewhere between Pohakueaea Point and La Perouse Bay. The rock may be off Pohakueaea Point as an extension of the lava flow that forms the point. Vessels making the run along this coast in recent years have observed no indication of an offshore danger; however, they give Cape Kinau a berth of about 1 mile, as it is known that a steamer struck bottom in the vicinity of the cape, probably about 0.2 mile offshore.

Lualailua Hills, 7 miles W of **Nuu Anchorage** and 2 miles inland, are a group of red mounds about 2,000 feet high.

Hokukano, 1 mile SW of Lualailua Hills, is a conspicuous red cone with a lava flow reaching the sea in a high black mass.

Pimoe, 2.4 miles W of Hokukano, is a red dome, irregular in shape, with its E side broken. The dome, 1,766 feet high, is the crater from which the large, fan-shaped lava flow in the vicinity of Pohakueaea Point had its origin.

Chart 19347.–Cape Hanamanioa, the SW extremity of Maui, is a black lava mass. **Hanamanioa Light** (20°35.2'N., 156°24.9'W.), 73 feet above the water, is shown from a 21-foot pole with a red and white diamond-shaped daymark. on the cape. A current is reported to set constantly NW past the cape; however, a short series of observations a mile SE of the light indicates a tidal current with a velocity of 0.8 knot at strength.

La Perouse Bay, between Cape Hanamanioa and Cape Kinau, is about 0.7 mile wide and indents the coast about 0.5 mile. On the NW side of the bay is **Puu Kanaloa,** a low, yellowish-brown cone at the water's edge, with its seaward side blown out. The crater is surrounded by a lava flow from **Kalua Lapa,** a small, black cone about 1 mile N of the bay. A rock with 10 feet of water over it is in the middle of the entrance to the bay, and the bottom is rocky. A rocky outcrop is on the NW side of the bay. Strangers are advised to exercise extreme caution in the bay.

Cape Kinau, 1.5 miles NW of Cape Hanamanioa, is a broad, low, black, lava point and a **protected area** of a Natural Area Reserve. A rock with 4½ feet of water over it is 400 yards offshore near the N end of the cape.

Puu Olai, about 2.5 miles N of Cape Kinau, is the most prominent landmark in this vicinity. The hill is brown in color, 367 feet high, and consists of three bare knolls, of which the southernmost is the highest.

Molokini, 5.5 miles NW of Cape Hanamanioa, is a small crescent-shaped islet about 0.3 mile long and 156 feet high. The islet is the bare rim of a crater, the N part of which is submerged. **Molokini Island Light** (20°38.0'N., 156°30.0'W.), 188 feet above the water, is shown from a white skeleton tower. A reef extends 300 yards N from the NW end of the islet; there is deep water close to the S side. Vessels pass on either side of the islet. In February 1978, unexploded ordnance was reported in the vicinity of the islet; caution is advised.

Makena Anchorage, 1 mile N of Puu Olai, is exposed to kona weather, but affords good holding ground during the trades. Anchorage can be had in depths of 12 to 15 fathoms off **Nahuna Point,** with a fairly prominent church bearing 100°. A few houses may be seen among the trees on the rocky point at the N side of the bight, and a prominent house is at the S end of the sand beach. The strong trade winds that are felt farther N in Maalaea Bay are not pronounced at Makena. Secondary roads lead along the coast and inland from the village. Anchorage can also be found in **Ahihi Bay,** just S of Puu Olai.

The country back of Makena rises gently to the mountains. The lower slopes are covered with cactus, while the slopes higher up are wooded in places. From Makena to Kihei the coast has a general N trend and is low and thickly covered with algaroba trees. The country back of the coast is like that in the vicinity of Makena.

Keawakapu is 8 miles N of Cape Hanamanioa. An apartment building on the small point at Keawakapu is the most prominent landmark along this coast. A fish haven, 200 yards by 1,150 yards, is 0.7 mile SW of Keawakapu.

Chart 19350.–Maalaea Bay is a large bight midway along the SW coast of Maui. The shores are low, mostly sandy, and fringed with algaroba trees.

The isthmus behind the bay and the slopes on either side are cultivated in sugarcane. Several hotels and resort developments can be seen along the E side of the bay.

Maalaea Bay is only a fair anchorage. Fresh winds sweep across the isthmus during the trades, and the bay is completely exposed to kona storms. The holding quality of the ground is poor. A N current has been reported in the bay. In the central and E portions the bottom is very irregular. A reef fringes the shore for a distance of 3.5 miles S of Kihei. Off Kalepolepo, where the reef is widest, a 14-foot spot is 0.5 mile offshore along the edge of the reef. Broken ground with a least depth of 3 fathoms lies about 0.7 mile WSW of the Kihei wharf. A shoal with a least depth of 7 fathoms is in the center of the bay; shoals with 3¾ and 4 fathoms are NE of this shoal. Strangers should pass well offshore.

Kalepolepo, is on the E side of Maalaea Bay, 11 miles N of Cape Hanamanioa. The radio towers of the former National Bureau of Standards radio station are a poor landmark. A large old fishpond extends 0.2 mile from shore. Local vessels anchor behind the reefs in depths of 3 to 4 feet.

Kihei is on the E side of Maalaea Bay 12 miles N of Cape Hanamanioa. A settlement is scattered among the trees and along the beach in the vicinity of the remains of a wharf.

Kealia Pond, just NW of Kihei, is separated from the bay by a narrow sand strip over which the shore highway passes.

Maalaea is a village on the NW shore of Maalaea Bay. A few buildings can be seen among the algaroba trees. The boat harbor at the village is about 500 yards long E to W, about 200 yards across, and is protected by breakwaters. Depths in the harbor are about 7 feet in the W basin and about 10 feet in the NE basin, mud bottom. In 1955, the entrance channel had a controlling depth of 10 feet. The entrance channel is marked by a **339°** lighted range; private buoys and daybeacons mark the boat harbor. A shoal area, marked by a daybeacon, with depths of about 1 foot extends from the center of the harbor N to the shore. Boats going to the public moorings in the W end of the harbor should pass between this daybeacon and the breakwater. Gasoline, diesel fuel (in cans), water, ice, marine supplies, and a launching ramp are available. Boats up to 65 feet can be handled for engine repairs. The harbor office is at the head of the harbor. The harbor experiences considerable surge during all but calm weather. A Coast Guard patrol boat moors in the NE part of the harbor.

Storm warning signals are displayed. (See chart.)

Chart 19347.–McGregor Point Light (20°46.8′N., 156°31.6′W.), 72 feet above the water, is shown from a 22-foot white tower on McGregor Point on the W side of Maalea Bay. The coast between McGregor Point and Olowalu is broken by low bluffs rising from the water's edge, behind which the country presents a barren appearance. The mountains have sharp jagged peaks and are cut by deep gorges.

Papawai Point, 0.9 mile W of McGregor Point, is the southernmost point of W Maui. Deep water is close inshore at the point.

Olowalu is on **Hekili Point,** 18 miles NW of Cape Hanamanioa. The deep gulch of **Olowalu Stream** appears as a gap in the mountains when abreast of the point and is an excellent night mark.

Launiupoko Point, about 2 miles NW of Olowalu, is low and rounding. About 0.8 mile inland from the point is an 808-foot hill that has a mottled, grayish-brown appearance. Shoal water extends about 0.2 mile offshore from the point NW to Lahaina. The highway skirts the shore between these points, and automobile lights along the road are usually the only lights seen along the coast. A TV relay tower is 140 yards back of the point, and a telephone company tower with orange and white horizontal stripes is 1.7 miles NW of the point.

A submerged obstruction (submarine) is moored within a circular area of 300 yards radius, centered in 20°51′14″N., 156°40′58″W., 0.8 mile WSW of Makila Point.

Chart 19348.–Lahaina is 23 miles NW of Cape Hanamanioa. Once the whaling capital of the mid-Pacific, Lahaina is now a colorful resort town and a favorite port of call of yachtsmen and boating enthusiasts. In the vicinity of Lahaina, canefields extend along the coast and for several miles inland on the ridges that lead to high, rugged mountains. A mill stack near the center of Lahaina is very prominent. A reef, over which the sea generally breaks, extends about 350 yards offshore from Makila Point, a mile SE of Lahaina, to Puunoa Point, a mile NW of Lahaina. **Mala** is a small settlement on the N side of **Puunoa Point.** The concrete wharf at Mala is in poor condition and is no longer in use.

Lahaina Light (20°52.5′N., 156°40.9′W.), 44 feet above the water, is shown from a 39-foot white pyramidal concrete tower at the inner end of the Lahaina small-boat wharf.

S of Lahaina wharf is a boat basin, about 200 by 800 feet, protected by breakwaters. The entrance channel is privately marked by buoys and a **044°26′** lighted range. In August 1979, the controlling depth was reported to be 8 feet in the channel. Depths inside the basin range from 5 to 10 feet. Vessels entering or leaving the boat basin should exercise caution as the combined effects of the swell and the 90° turn into the basin can set vessels onto the shoal opposite the basin entrance.

Anchorage.–A special anchorage is W of Lahaina. (See 110.1 and 110.128a, chapter 2, for limits and regulations.)

Limited quantities of small-craft supplies can be obtained at Lahaina; a 1-ton hoist is available on the small-boat wharf.

Storm warning signals are displayed. (See chart.)

Off Lahaina is good anchorage, and calm water will generally be found even though strong trade winds are blowing elsewhere. However, the anchorage is exposed in kona weather. In approaching this anchorage vessels should keep about 1 mile offshore until the light bears 056°, then head in on this course and anchor in depths of 9 to 15 fathoms. Anchorage can be had anywhere in the bight N of Mala wharf, 0.6 mile offshore in depths of about 12 fathoms, sandy bottom.

Currents.–The current off Lahaina usually sets N and reaches a maximum velocity of 1 or 2 knots before low water. Before high water the current is normally quite weak and may set either N or S.

It is reported that the current near the wharf at Mala sets S most of the time.

The coast between Mala and Kekaa Point consists of a low, sandy beach with a fringe of coconut and algaroba trees, back of which the canefields extend inland for about 2 miles. Buildings can be seen along the coast among the trees.

Puu Laina, 1.2 miles NE of Mala, is a prominent cone 650 feet high. The lower slopes of the hill are covered with cane.

Hanakaoo Point, 2 miles N of Mala, is rounding and not conspicuous from offshore. The 10-fathom curve is about 500 yards off this point, and the bottom slopes gradually to the sandy beach. A hotel is on the S side of the point.

Chart 19347.–Kekaa Point (20°55.8'N., 156°42.0'W.), 26 miles NW of Cape Hanamanioa, is the westernmost extremity of Maui. The point is a dark, rocky promontory, 85 feet high, which appears detached from a distance; there are no offshore dangers. A hotel is on the point. A prominent mill stack is 0.8 mile N of the point.

A northward current is reported off Kekaa Point. A tidal current of 0.5 knot, setting N and S, was observed 0.5 mile from the shore.

From Kekaa Point to Lipoa Point, the coast consists of low bluffs and stretches of sand beach along which may be seen clumps of algaroba trees and several resort hotel complexes. The gently sloping country is cut by shallow gulches and is covered with cane and pineapple which extend well up the mountain slopes.

Napili Bay, 4.5 miles N of Kekaa Point, is a small bight between two coral reefs. Anchorage can be found about 0.5 mile offshore in depths of 5 fathoms, but it is seldom used. N currents are reported off the bay. Small boats can land in Napili Bay during tradewind weather. Breakers extend 0.2 mile offshore for a distance of 1.5 miles S of the bay.

Hawea Point Light (21°00.4'N., 156°40.2'W.), 75 feet above the water, is shown from a pyramidal skeleton tower with a diamond-shaped red and white daymark 5 miles N of Kekaa Point.

Honolua Bay is the open bight on the S side of **Lipoa Point,** which is 7 miles NE of Kekaa Point. Smaller vessels can find fair anchorage in the bay, and boats can land in the cove at the NE end. A concrete boat ramp is at the head of the cove.

In the vicinity of Lipoa Point, the bluffs along the N shore of Maui become higher and more precipitous. Also, the bluffs are cut up by more bights and headlands. The country is more rolling and is cut by deeper gulches. The mountains are steeper and greener. Near their tops the mountains are wooded in places. Patches of black rocks, awash at high water, are found close inshore off several of the points in the vicinity. Vessels should give this coast a berth of at least 0.8 mile.

Kanounou Point, about 2 miles ENE of Lipoa Point, has several bare, black rocks a short distance offshore.

Honokohau, on the W side of Kanounou Point, consists of a few houses at the mouth of **Honokohau Stream.** There is little protection off the village.

Nakalele Point is 3 miles ENE of Lipoa Point; the SE face of the point has waterspouts. Close off Nakalele Point are several bare, black rocks. **Nakalele Point Light** (21°01.9'N., 156°35.6'W.), 141 feet above the water, is shown from a pole with a red and white diamond-shaped daymark.

Chart 19342.–Kahakuloa Head, 3 miles SE of Nakalele Point, is the seaward end of one of the numerous abrupt capes in this general vicinity. **Puu Koae (Sugarloaf),** a dark bare, conical mound 634 feet high, is on Kahakuloa Head; this feature is one of the most conspicuous landmarks on the island of Maui. E and close to Puu Koae, on the same ridge, is a low and more rounded dome. **Kahakuloa** is a small village in **Kahakuloa Bay,** just W of Kahakuloa Head. A spire can be seen in the village. Kahakuloa is the last settlement on the paved road that skirts the W and N shores of Maui. Deep water is found close to the head, although there are numerous breakers and covered rocks just offshore. A rock, covered 4½ feet, in surrounding depths of 15 to 20 fathoms, is 0.4 mile off the head of the cove between Puu Koae and Mokeehia Island.

Mokeehia Island, 1.4 miles SE of Puu Koae, is a large, bare rock 170 feet high, just off the outer end of **Hakuhee Point.** Caverns can be seen in the faces of the cliffs on both sides of the island.

Puu Olai, 0.7 miles inland from Mokeehia Island, is 1,002 feet high.

Hulu Island, 95 feet high and close to shore, is 2 miles S of Mokeehia Island. Several rocks are close S of the island.

Waihee Point is 2.6 miles S of Mokeehia Island. SE of the point is extensive **Waihee Reef,** and back of the point is deep and precipitous **Waihee Valley,** which is quite prominent.

Iao Valley, also deep and precipitous, is 6 miles S of Mokeehia Island; some of the finest scenery on Maui is found in this vicinity.

Wailuku at the mouth of Iao Valley and 1.5 miles from the coast, is the seat of Maui County and is the largest town on the island. The town has a hospital, hotels, and numerous stores; a white multistory building in the center of the town is prominent. There is a direct highway to Kahului.

Kahului Harbor, on the S side of **Kahului Bay** 6 miles SE of Mokeehia Island, is protected by breakwaters which extend outward from the W and E shores. On the SE side of the harbor is the commercial deepwater port of **Kahului.**

Prominent features.–Pauwela Point Light (20°56.9'N., 156°19.5'W.), 169 feet above the water, is shown from a 47-foot white pryamidal skeleton tower 9 miles ENE of Kahului Harbor and is the principal mark for the approach. Other marks are an aero light at the airport E of Kahului, the breakwater lights, the lighted entrance range, the powerplant stacks E of the piers, the radio tower 0.8 mile W of the rear range, and the Wailuku spire and stack 2 miles W of the harbor.

A flashing amber warning light, privately maintained and shown from the roof of the shed on Pier 2, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

COLREGS Demarcation Lines.–The lines established for Kahului Harbor are described in 80.1460, chapter 2.

Channels.–From deep water on the N, the channel leads between the breakwaters, then turns sharply SE to the Kahului piers. A Federal project provides for an entrance channel 35 feet deep and a harbor basin of the same depth. Channel and basin are maintained at or near project depth. Navigational aids include lighted and unlighted buoys, breakwater lights, and a 177° lighted range.

Anchorages.–Swinging room inside the breakwaters is too restricted for large vessels, which may anchor E of the sea buoy, but caution is necessary to avoid dragging by the prevailing NE trades. Small craft have plenty of anchorage room in the unimproved areas behind the breakwaters.

Dangers.–Waihee Reef, NW of the breakwaters, and **Spartan Reef,** NE of the breakwaters, extend 0.7 mile and 1.2 miles offshore, respectively. Vessels approaching the harbor entrance range from either direction should avoid the reefs. The W part of the inner harbor is shallow.

Tides and currents.–The diurnal range of tide is 2.3 feet at Kahului. Harbor currents are weak.

Weather.–The prevailing winds are the NE trades.

Storm warning signals are displayed. (See chart.)

Pilotage.–This is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade with a Federal licensed pilot on board.

The pilot boat, MAUI, is 26 feet long with a yellow hull and the word PILOT in black letters on the hull. The pilot boat displays the International Code flag "H". The pilot boarding station is about 1 mile seaward of the breakwater on the entrance channel rangeline. The pilots monitor and use as a working frequency VHF-FM channel 12 (156.60 MHz). Mariners are requested to give at least 24 hours advance notice of arrival and gross tonnage, length, and draft of vessel; telephone (808-572-7343). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots.

Towage.–A 1,500 hp tug is available at the port.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) There is a private hospital between Kahului and Wailuku.

Kahului is a **customs port of entry.**

Harbor regulations.–These are established by the Harbor Division of the Hawaii Department of Transportation. The harbormaster enforces the regulations and assigns berths and anchorages.

Wharves.–The State-owned and operated piers are on the SE side of the harbor. General cargo is usually handled by ships' tackle, and cargo to and from barges by forklift trucks; crawler and truck cranes are available. Transit sheds with 108,000 square feet of covered storage space and 8 acres of open storage space are available at the piers. Truck lines serve the piers. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

Pier 1: 1,274 feet of berthing space along the SW side; 35 feet reported alongside; deck height, 9 feet; two traveling bulk sugar loading towers with conveyors and loading spouts, loading rate 800 tons per hour; receipt and shipment of general and containerized cargo; receipt of petroleum products, dry bulk and liquid fertilizers, and lumber; shipment of bulk raw sugar and molasses.

Pier 2: 880 feet of berthing space along the NE side, 24 feet reported alongside; deck height, 9 feet; 290 feet of berthing space along the NW side, 30 feet reported alongside; receipt and shipment of general and containerized cargo by barge; receipt of lumber, bulk cement, liquefied petroleum gases, and petroleum products; shipment of cattle and produce; fueling of fishing vessels.

Pier 3: extends NE from the foot of Pier 2; 500 feet of berthing space along NW side, 18 feet reported alongside; deck height, 9 feet; receipt and shipment of general and containerized cargo by barge; fueling and provisioning of fishing vessels.

There is a surge at the piers during periods of heavy N swells; this occurs about 10 times a year. Departing vessels may have some difficulties in breasting off from Pier 1 during kona weather.

Supplies.–Gasoline, diesel fuel, and water are available at both piers; gasoline is trucked in. Bunker C fuel can be obtained in limited quantities by truck. Ice and some marine supplies are available.

Repairs.–Kahului has no facilities for making repairs or drydocking deep-draft vessels. The nearest such facilities are in Honolulu. There are machine, electrical, and welding concerns off the waterfront for making above-the-waterline repairs to vessels.

Communications.–Kahului has regular interisland barge service and is a port of call for transpacific vessels, but interisland passenger travel is almost entirely by air. Telephone communication is available to the other islands and to the mainland.

The coast is low between Kahului Harbor and Pauwela Point. The back country is planted in sugarcane and pineapple.

Paia is 6 miles E of Kahului Harbor and a mile inland. An opening in Spartan Reef off Paia is sometimes used by local craft seeking anchorage behind the reef.

Maliko Bay, 8 miles ENE of Kahului Harbor, is a narrow opening with steep, rocky sides. The bay provides fair anchorage for small craft in depths of 1½ to 5¼ fathoms, rocky bottom, when the trade winds are blowing. Rocks and foul ground, which extend from the E side of the entrance to the bay to about halfway across, form a natural breakwater. Rocks on the W side of the entrance restrict the channel to a width of about 100 yards. A reef that bares is on the SW side of the bay about 0.1 mile inside the entrance. Small craft can be launched from the beach at the head of the bay.

Pauwela Point, 9 miles ENE of Kahului Harbor, is marked by a prominent light which has already been described. An E current is reported off the point. **Pauwela** is a mile inland. Back of Pauwela are several hills with heavily wooded tops.

Chart 19340.–Paralleling the NE coast of Maui is a State highway which is the main link between Kahului and Hana. From Pauwela E the road is a succession of sharp turns and steep grades as it winds from and toward the shore in crossing the numerous gulches. Sections of the highway can be seen from seaward, but it disappears as it follows the gulches inland.

Between Pauwela and Nahiku, a distance of about 15 miles, the bluffs reach heights of 300 to 400 feet, then gradually lose elevation to the SE, and are low in the vicinity of Hana. The back country is generally green, and the higher slopes are heavily wooded. Because of the heavy rains, waterfalls are numerous in the many gulches that lead to the sea. Very little of this NE coast is planted in sugarcane. From Pauwela Point to Waipio Bay the land on the seaward side of the coastal highway is under pineapple cultivation, and there are many taro patches at Keanae and Nahiku. The slopes SE of Nahiku are grazing areas for cattle. There are many inshore rocks between Pauwela Point and Hana, but all such dangers can be avoided by keeping a mile offshore.

Uaoa Bay, 3 miles E of Pauwela Point and just E of **Opana Point,** indents the coast about 0.4 mile. Fair anchorage during S winds can be had 0.3 mile offshore in depths of 12 to 16 fathoms, sandy bottom. A large detached rock off Opana Point marks the W side of the bay.

Pilale Bay, 4 miles E of Pauwela Point, is a small opening at the mouth of a deep valley. Small boats can find fair anchorage during tradewind weather in depths of 4 to 7 fathoms a short distance off the beach.

Waipio Bay, 6 miles E of Pauwela Point, lies between **Honokala Point** and **Huelo Point** and is open to the NE. **Huelo** is a small village along the highway 0.5 mile inland; a church steeple is fairly prominent from seaward.

Hoalua Bay, 7 miles SE of Pauwela Point is small and too exposed for anything but emergency anchorage. Under favorable conditions landings can be made at the head of the bay.

Oopuola Cove, 8 miles SE of Pauwela Point, is narrow and steepsided. A reef lies just N of the point on the W side of the entrance. Beach landings can be made at times, and small boats can find anchorage in depths of 3 to 6 fathoms near the center of the cove. **Puu Kukai,** 574 feet high, is 0.5 miles W of the cove.

Keopuka Rock, 141 feet high, is 9.5 miles SE of Pauwela Point and close to shore. The rock's double-humped top is distinctive from E or W, but from directly offshore it blends into the cliffs behind it.

Honomanu Bay, 10 miles SE of Pauwela Point, is a good landing place and a fair small-boat anchorage during the trades, although the swell is felt in the bay. Anchorage can be found in depths of 2 to 3 fathoms about 200 yards from the black shingle beach at the head of the bay. The E side of the bay is shallow. **Puu o Kohola,** 844 feet high, is 0.5 mile W of the bay.

Nuaailua Bay, close E of Honomanu Bay and on the W side of Keanae Point, is the only suitable anchorage for moderate-size vessels along this NE coast. The bay is somewhat exposed to the NE trades, but is partly protected by Keanae Point. A 250-foot vessel can anchor in depths of 13 to 15 fathoms in the middle of the main bay; the bottom is quite even and has good holding qualities. Approach from seaward should be made on a due S course, keeping about 0.3 mile off the W shore and well clear of the 15-foot lone, black rock which is 0.3 mile off the E shore.

Keanae Point, 11 miles SE of Pauwela Point, is a low, flat peninsula that juts out 0.3 mile from the bluff line. Landings should not be attempted on the point proper because of the covered rocks and ledges on all sides. A scattering of houses can be seen on the point.

Keanae Valley is the largest and most prominent valley on this part of Maui. The valley leads inland 7 miles from the vicinity of Keanae Point to **Koolau Gap,** the large opening in the N rim of Haleakala Crater.

Pauwalu Point is 1 mile SE of Keanae Point. **Mokumana Rock,** close off Pauwalu Point, is 77 feet high and flat-topped; the rock is particularly outstanding when approached from the E, but from some directions it appears to be a continuation of the point although there is a separation of some 50 yards.

Aluea Rock, 2 miles SE of Keanae Point and about 0.2 mile offshore, is only a few feet high and has the appearance of a reef awash as the seas break over it continuously and covered rocks extend another 300 yards from shore. This area should be avoided by all boats.

Wailua consists of a few houses along the shore of the small bight immediately SW of Aluea Rock.

On the E side of the bight is a high wooded bluff, and the W side is low and grass-covered. The highway leading to Hana leaves the shore W of the bight and from seaward it may be seen high up on the ridges as it winds its way SE.

Nahiku, 15 miles SE of Pauwela Point, is a small settlement on the E side of an open bight. Anchorage can be found in depths of 7 fathoms close to shore, but strangers should not attempt it because of the two covered rocks near shore. A SE current is reported off Nahiku, and the inshore current between Nahiku and Kauiki Head is said to be weak. **Kuhiwa Gulch** extends inland from the vicinity of Nahiku and is visible from seaward.

Opikoula Point is a low, rocky bluff on the E side of the Nahiku anchorage. Similar bluffs extend 5 miles SE to Pukaulua Point, and there are no easily recognized landmarks. This reef-fringed stretch of coast is not recommended for small-boat landings.

Low **Pukaulua Point** is 2.5 miles NNW of Hana Bay and Kauiki Head. **Hana Airport** is 0.5 mile NW of the point; the main runway is laid out in an E-W direction and is close to the bluffs.

Chart 19347.–Alalakeiki Channel, between Maui and Kahoolawe, is about 6 miles wide. The channel is clear of dangers, with the exception of Molokini, which is marked by a light.

Observations show that the **current** usually flows NW with a maximum velocity of 0.7 knot on the W side of the channel near Kahoolawe Island, and SSE with a maximum velocity of 0.4 knot along the E side of the channel near Maui Island. Velocities up to 1 knot have been observed in the channel.

The trade winds draw through the channel, hauling around the N end of Kahoolawe. The trades blow with much force at the E entrance to the channel, but in the vicinity of Molokini it is generally calm.

Auau Channel, between Maui and Lanai, is about 8 miles wide. With the exception of a reef about 3 miles long, which extends not more than 0.5 mile offshore N of Kikoa Point, Lanai, the channel is free from obstructions. The aerolight at Molokai airport can be seen when passing through Auau Channel.

Observations in Auau Channel show that the **current** seldom floods, but that the flow is mainly in the ebb direction; ebb is E with a velocity of 1.1 knots. Beginning with maximum ebb, the current decreases to a minimum ebb or slack and then increases to a maximum ebb without a significant flow in the flood direction. Maximum velocities of 2 knots have been observed. (For predictions see the Tidal Current Tables.) During trade winds it is often calm in the channel.

Pailolo Channel, between Maui and Molokai, is about 7.5 miles wide. The channel is clear of obstructions with the exception of Mokuhooniki and Kanaha Rock, near the E end of Molokai, and a reef about 0.8 mile wide which fringes the shore of Molokai.

Observations show the **current** in the channel to set NE with a velocity of about 0.3 knot. The maximum velocity observed was 0.6 knot.

In navigating this channel, the tanks on Molokai and Maui will prove useful landmarks; those on Molokai are on the SE shore, near Pukoo, and those on Maui are on its WNW side, near Kekaa Point.

Chart 19347.–Kahoolawe Island, 6 miles W across Alaiakeiki channel from the SW extremity of Maui, has an area of 45 square statute miles and is the smallest of the eight major islands. Kahoolawe is about 10 miles long and 6 miles wide, and from a distance has an even, unbroken appearance. The high cliffs on the E and S sides are almost black; the soil of the mountain tops and the gentle slopes of the N and W sides are reddish. The island has scarcely any rainfall, and the huge clouds of red dust which trail to leeward during strong winds can be seen for many miles. **Moaula,** a brown dome 1,444 feet high near the E end of the island, is the most prominent landmark.

Warning.–Kahoolawe is under Naval jurisdiction and is closed to the public. The **danger zones** of an aerial bombing target and a naval shore bombardment area extend about 2 miles from all sides of the island. Potentially dangerous unexploded ordnance litters much of the island. Landing on Kahoolawe Island is prohibited without the advance consent of the Commander, Third Fleet, Pearl Harbor, Hawaii 96860. (See 204.223, chapter 2, for limits and regulations.)

From **Cape Kuikui,** the most N point of the island, to Kanapou Bay, the coast is rocky and the bluffs gradually increase to cliffs several hundred feet high at the bay.

Ule Point, 2.8 miles SE of Cape Kuikui, is on the N side of Kanapou Bay.

Kanapou Bay, 2 miles wide between Ule Point and **Halona Point,** offers protection in kona weather. Anchorage is available for small vessels in **Beck Cove** on the SW side of the bay. The bay should be entered on a SW course, heading for the middle of the cove, and anchorage should be made in depths of 15 to 20 fathoms off the mouth of the cove and midway between the sides. The bottom shoals rapidly from depths of 12 to 3 fathoms about 0.2 mile from the sandy beach at the head of the cove. W winds draw down the canyon at the head of the cove with considerable force.

From **Kaka Point,** the SE point of Kahoolawe, to within 1 mile of Smuggler Cove on the SW side, the coast consists of sheer cliffs which reach a maximum height of 800 feet at Kamohio Bay. There are no offlying dangers except Puukoae Island.

Kamohio Bay and **Waikahalulu Bay,** 3 and 6 miles W of Kaka Point, respectively, each indent the coast about 0.7 mile. Neither bay can be recommended as an anchorage because of the deep water close to the shores. The bays are subject to strong gusts of wind that sweep down over the high cliffs when the trades are blowing. On the W side of

Kamohio Bay is **Puukoae Island,** a black mass of rocks 378 feet high and about 100 yards offshore.

Kahoolawe Southwest Point Light (20°30.3′ N., 156°40.2′ W.), 140 feet above the water, is shown from a 40-foot white skeleton tower near the SW end of Kahoolawe Island.

The prevailing current along the S coast of Kahoolawe Island is W.

Smuggler Cove is 1 mile SE of **Kealaikahiki Point,** the westernmost point of the island. The cove is the best anchorage on the island except during W or S weather. Anchorage can be had in depths of 10 to 12 fathoms 0.5 mile off the sand beach. The prevailing current at the anchorage is NW. The best landing is on the sand beach close to the conspicuous black rock at the head of the cove. The shore is low and has alternate stretches of sand and rocks. A stream, which is usually dry, and a clump of algaroba trees may be seen. As many as five buildings may be seen on the shore above the beach.

Kuia Shoal, with a least depth of 1 fathom, extends 0.7 mile W from Kealaikahiki Point. A shoal with a least depth of 3 fathoms is about 0.5 mile SW of Kuia Shoal. Vessels should give the point a berth of at least 1.5 miles. The country slopes up evenly from Kealaikahiki Point to the E.

The NW coast is rocky and has a line of low bluffs from which the country slopes gently up to the reddish hills in the center of the island. There are scarcely any distinguishing marks and no off-lying dangers.

Kuheia Bay, 2 miles SW of Cape Kuikui, is a very small bight where boats can land at times.

Kealaikahiki Channel, between Kahoolawe and Lanai, is about 15 miles wide. The channel is free from obstructions. Currents in the channel are weak and variable and are influenced by the wind. A maximum velocity of 0.5 knot in a general NE direction was observed in 1962. Sailing craft should avoid this channel during trade winds, as long periods of calms sometimes occur S and W of Kahoolawe and Lanai.

Chart 19340.–Lanai, 8 miles W across Auau Channel from Maui and the same distance S across Kalohi Channel from Molokai, has an area of 141 square statute miles and ranks sixth in size of the eight major islands. Lanai is about 15 miles long in a NW direction and about 10 miles wide near its S end, gradually narrowing toward its NW end. The highest point on Lanai is **Lanaihale,** 3,370 feet high and 3.5 miles inland from the SE side of the island. The slopes on the E side of the mountain are steep and cut by gulches; those on the W side are more gradual, terminating in a rolling plain between the 1,000-and 2,000-foot levels. There is little rainfall, and, in general, the island has a barren appearance. The central portion of the island is covered with extensive pineapple fields which, because of their position on a high plain, are not easily seen from the sea. Pineapple cultivation is the principal occupation, although some livestock is raised. **Lanai City,** the only large community, is in the center of the island.

Chart 19347.–The coast is low, sandy, and brush-covered from **Kikoa Point,** the easternmost point of Lanai, to **Kamaiki Point,** 3.1 miles SSW. A coral reef and shoal water fringe the shore from 200 to 400 yards off the beach. Low bluffs appear to Kamaiki Point, gradually increasing in height until close to Manele Bay, where they reach a maximum of about 400 feet.

Manele Bay is a small indentation in the S coast of Lanai, 3 miles SW of Kaimaiki Point; a lighted buoy is off the entrance, the ruins of a cattle loading ramp, resembling a fisherman's scaffolding, are on the SW point of the bay, and the wreckage of a barge is on the N shore.

Manele Small-Boat Harbor, protected by a breakwater on the S side, is in the NW corner of the bay; a light marks the end of the breakwater. A dredged channel leads from Manele Bay N of the breakwater thence SW to a mooring basin. In April 1979, the controlling depths in the dredged channel were 10 feet, except for shoaling to 5 feet along the N edge to abeam the breakwater light, thence 6½ feet from abeam the breakwater light SW to the basin, except for shoaling to 1½ feet along the NW edge, thence depths of 8 to 11 feet were available in the basin; general depths of 4 to 6 feet are available in the boat slips. In December 1981, a rock covered 3 feet was reported about 30 yards NW of the breakwater light in 20°44′45″N., 156°53′23″W. A fishing pier and launching ramp are at the head of the harbor.

A low rock, over which the sea usually breaks, is 300 yards seaward from the entrance point on the E side of Manele Bay. Small local vessels have anchored in depths of 14 fathoms about 350 yards SW of the rock. Under certain conditions, when the trade winds are blowing, squalls will be alternately from the head of the bay and from the NE. This causes an anchored vessel to swing considerably, and it usually will be found advantageous to shift anchorage to the bay W of Puupehe Rock, where the squalls are not so pronounced.

Puupehe Rock, 0.5 mile SW of Manele Bay, is 110 feet high, brown on its steep sides, and flat and grass-covered on its top. It is separated from the shore by a short, low sandspit. The rock is the most prominent landmark along this section of the coast. Rocks, over which the sea usually breaks, extend 300 yards E and S from Puupehe Rock. **Hulopoe Bay,** just to the W of the rock has a sandy beach at its head. Anchorage can be found about 400 yards from the head of the bay in depths of 8 fathoms, sandy bottom.

From Manele Bay to Palaoa Point, the coast consists of low bluffs, behind which the land rises in steep slopes to the tableland above. It is reported that the currents are weak along the S coast of Lanai. A high, detached, grass-covered rock is close to the shore 1.8 miles W of Puupehe Rock. Many small rocks are close to the shore; one, awash at times, is 400 yards offshore and about 2 miles E of Palaoa Point. No buildings can be seen along this coast.

Palaoa Point Light (20°44.1′ N., 156°58.0′ W.), 91 feet above the water, is shown from a white skeleton tower on the E prong of a double point at the SW extremity of Lanai Island. A small bight, with a rocky shore on which small boats can usually land during trade-wind weather, is between the double points. A small black rock, about 5 feet high, is about 200 yards off the N side of the point. Another rock, about the same distance offshore but 0.3 mile N, is about 28 feet high.

Beyond Palaoa Point, the coast has a NNW trend. Between the point and Kaumalapau Harbor, the sheer coastal bluffs of **Pali Kaholo** are more than 1,000 feet high in some places. The bluffs are marked by two landslides; one, very large and conspicuous, is 1.5 miles N of Palaoa Point; the other, not so large, is 2.5 miles N of the point.

Puu Ulaula, 1,271 feet high, is 2 miles N of Palaoa Point and a mile inland from Pali Kaholo. There is an air-navigation installation on the summit.

Chart 19351.–Kaumalapau Harbor, 3.5 miles N of Palaoa Point, is the best harbor on Lanai in all but W and kona weather. The harbor is a small bight at the mouth of the most prominent gulch in the vicinity. A shoal area, marked by unlighted buoys at the outer extremity, extends along the S and E sides of the harbor. Many local fishing craft moor to unlighted mooring buoys in the harbor.

Kaumalapau is a commercial barge landing on the N side of the harbor.

Kaumalapau Light (20°47.2′ N., 156°59.7′ W.), 66 feet above the water, is shown from a 13-foot white house on the S side of the harbor entrance. Oil tanks are prominent on the high ground back of the wharf. A private aerolight is about 2.3 miles E of the harbor.

A 250-foot breakwater on the N side of the harbor entrance has a light on its outer end. There is no entrance channel but a 600-foot opening leads to a turning basin which is 30 to 50 feet deep and about 500 feet by 800 feet. The private wharf provides cargo sheds and about 400 feet of berthing space. Private facilities also include two 35-ton and one 30-ton cranes, bulk-handling and storage for petroleum products.

Gasoline, diesel fuel, and water can be obtained on the Kaumalapau wharf. Small craft up to 40 feet can be handled by a derrick to the deck of the wharf, and small machine repairs can be made at a nearby shop.

Between Kaumalapau Harbor and Kaena Point, the coast is a series of bluffs, in some places precipitous and 300 to 400 feet high. The shore is rocky, with a few short stretches of sand. In general, the bottom is fairly steep-to, but small vessels can find anchorage with sufficient swinging room in some places. At times, when the trades are blowing, the wind sweeps down the gulches in heavy gusts which are felt for a mile or more offshore. There are no houses or trees of any size along this coast, which has a barren appearance.

Five Needles, about 2.3 miles N of Kaumalapau Harbor and near the middle of the W side of the island, are a group of detached pinnacle rocks. The outermost rock is about 300 yards offshore and 32 feet high, and the inner pinnacle is 120 feet high. The rocks are of the same material as the higher cliffs of the shore and are therefore not easily recognized from offshore.

Keanapapa Point, 7.5 miles NW of Kaumalapau Harbor, is the westernmost point of Lanai. The point is low and rocky and is marked by a small knoll 150 yards inland from the shore. A small detached rock, 8 feet high and 150 yards offshore, is 1.9 miles SE of Keanapapa Point. The cliffs, which are 200 feet high in the vicinity of this rock, gradually diminish in height until they are only 20 or 30 feet high 0.5 mile S of Keanapapa Point.

Kaena Point, 1 mile N of Keanapapa Point, is low and rocky and is hard to distinguish from the other points in the vicinity. The low, rounding, unlighted, NW coast of Lanai is not easily seen at night, and vessels should give it a berth of at least 1 mile, although 0.5 mile will clear all dangers. There are many small, rocky points and short, sandy indentations in this vicinity, and boats can land in the lee of the points at times.

About 1.5 miles ENE of Kaena Point is a 1-mile-long stretch of sand beach, with no fringing reef, that provides easy landing for small boats. E of this beach the coral reef fringes the N and E sides of Lanai to a width of as much as 0.3 mile. In general, the beach is backed by a low, narrow strip of land that rises gently to the tableland. Vegetation consists of cactus, low brush, and a few small trees.

Chart 19347.–Pohakuloa Point, marked by a light, 4 miles ENE of Kaena Point, is so low and rounding that it is difficult to recognize as the N extremity of Lanai. A 150-yard opening in the reef 0.4 mile E of the point affords small-boat access to the sand beach. Two wrecks on the reef that fringes the N coast are very prominent. One wreck is 0.7 mile W of Pohakuloa Point; the other wreck is 4.4 miles E of the point.

Maunalei Gulch, 6 miles E of Pohakuloa Point, is forked and should not be confused with deep **Hauola Gulch,** 2 miles farther to the SE. A hard-surface highway leads from Lanai City to the mouth of Maunalei Gulch; a group of beach houses, probably **Kahokunui,** is 0.8 mile NW of the gulch.

Keomuku, 10 miles SE of Pohakuloa Point, has a few houses and a church, none of which are prominent from offshore. There is a shallow opening in the reef off the village, and boats of less than 4-foot draft find anchorage behind and S of the entrance.

The NE coast of Lanai should be given a berth of at least 0.8 mile. Current information for this coast is included in discussion of Auau Channel.

Kalohi Channel, 8 miles wide between Lanai and Molokai, is free of dangers except for the marginal reefs around the two islands.

Currents.–Observations made in Kalohi Channel show reversing currents with average maximum velocities of 0.5 knot. The flood sets NE, and the ebb sets SW. (See Tidal Current Tables for predictions.)

Chart 19340.–Molokai Island, 7.5 miles NW across Pailolo Channel from Maui and 8 miles N across Kalohi Channel from Lanai, has an area of 259 square statute miles and ranks fifth in size of the eight major islands. More or less rectangular in shape, Molokai is about 34 miles long in a W direction and about 7 miles wide. The E end is mountainous; its summit is **Kamakou,** 4,970 feet high. On the N side, the mountain slopes are very steep, in many places almost perpendicular, and numerous deep gorges with precipitous sides can be seen. On the S side, the slopes are gradual, cut by gorges, and terminate in a narrow strip of rolling land near the coast. On the W side, the land slopes gently and is cut by gulches; here and there the crater of an extinct volcano can be seen. About 10 miles from the W end of the island the plain is only a few hundred feet high and is marked here and there by prominent blowholes. The entire W end of the island is a bare table land cut by small gulches and rising gradually to **Mauna Loa,** 1,400 feet high. From seaward this part of the island presents a smooth and rolling appearance.

The island does not have sufficient water for economic raising of sugarcane. The principal products are pineapples and cattle.

Anchorage.–Depths along the S and W coasts of Molokai are such that vessels may anchor at will, having due regard for the abrupt shoaling inside the 10-fathom curve. The bottom is mostly coral and sand. The E end of the island is exposed to the NE trades, and the N coast is exposed and offers very little protection. The only traffic along the N coast is the twice-yearly supply barge that calls on the leper colony at Kalaupapa. Kamalo Harbor and the boat lagoon in Pukoo Harbor are the only harbors on the S side of the island considered safe during kona storms.

Currents.–Current observations have been made at several places along the S shore of Molokai between Kamalo and Laau Point. They indicate, in general, an E flow along the shore in the vicinities of Kaunakakai and Kamalo and a W flow near Laau Point. Combined with these movements are tidal currents which usually reach an E maximum velocity about the time of low water at Honolulu and a W maximum about the time of high water. The W flow near Laau Point is reported to turn sharply N at the point, and vessels should guard against a set toward the point. Currents are said to set W along the entire N coast of Molokai and NE along the E coast. (For further current information covering waters adjacent to Molokai, see the discussions of Pailolo, Kalohi, and Kaiwi Channels.)

Weather.–The trade winds divide at Cape Halawa; one part follows the N shore and another part follows the S shore. Because of the topography of the island the trade wind is frequently a little S of E along the S coast of Molokai. The wind is usually light in the early morning, but blows with considerable strength in the middle of the day. During strong trades, dust clouds appear over the W end of the island. Very heavy rainfall is found on the NE side of the island; the S and W sides have very little rainfall.

Supplies.–Provisions and some marine supplies are available at Kaunakakai. Gasoline and diesel fuel can be delivered by truck to the Kaunakakai pier. There are no other sources of provisions on Molokai.

Communications.–The island has telephone communication with the other islands and with the mainland. Good roads extend from Kaunakakai, on the S coast, to Molokai Airport, in the W central part of the island, and to Kamalo, Kolo, and other small towns. Interisland air and barge service are available.

From Cape Halawa, the E part of the island, to Kamalo, a distance of about 12 miles, the coast has a general SW trend; thence to Laau Point, a distance of about 25 miles, the trend is W. A reef about 1 mile wide fringes almost the entire coast, the widest part being in the bight about 13 miles E of Laau Point. During the day the limits of the reef can generally be determined by the breakers, but, at night, vessels are cautioned to give this coast a good berth.

Chart 19347.–Cape Halawa, the E point of Molokai, is a brown cliff about 300 feet high. Breakers extend about 300 yards off the point and a rock, which bares at times, is 250 yards offshore. During the heavy E sea, it is apt to be quite choppy off this point and vessels should give the cape a berth of about 1.5 miles.

Koalii, 1 mile W of the cape, is a hill 794 feet high. In general, the coast between Cape Halawa and Kaunakakai Harbor is low, but rises, first gently, then rapidly, to high, rugged mountains that are cut by many gulches.

Mokuhooniki, a small, yellow, bare, rocky islet, 198 feet high and with almost perpendicular sides, is 0.9 mile offshore and 1.6 miles S of Cape Halawa. **Kanaha Rock,** 95 feet high, is about 50 yards SW of Mokuhooniki. Midway between the rocks and Molokai are depths of about 15 fathoms.

Honouliwai, 3.5 miles SW of Cape Halawa, is a small indentation in the coast and offers small boats a little protection from the trades. It should be entered only with local knowledge. About 0.3 mile NE of Honouliwai is **Honoulimaloo,** a small bight in the coast. The coral reef trends farther offshore from Honouliwai SW.

Waialua, 4.6 miles SW of Cape Halawa, consists of a few houses at the mouth of a gulch.

Pauwalu Harbor, 5 miles SW of Cape Halawa, is a double opening in the reef. The W opening is about 200 yards wide and is usually marked by breakers on either side. Within the entrance is a small pocket with depths of about 2 fathoms, where a few local vessels find some shelter. A house and tank near the beach are partly hidden by trees. The reef extends 0.6 mile offshore, and the 10-fathom curve is about 0.7 mile offshore.

About a mile SW of Pauwalu Harbor is another opening in the reef near **Kainalu.**

Chart 19353.–Pukoo Harbor, 7.4 miles SW of Cape Halawa is a pocket in the reef some 800 yards long and 250 yards wide. A depth of 11 feet can be carried across the entrance bar at the reef line and behind the reef line for about 600 yards. A privately dredged channel continues to a three-fingered boat lagoon that occupies the former location of the Pukoo Fishpond. The entrance to the lagoon is a 60-yard opening through a rock seawall. Channel depths range from 12 feet to 8 feet at the lagoon entrance; depths in the lagoon are 6 feet. The lagoon offers excellent protection to small craft in all weather. The outer harbor is smooth during the trades, although the wind sweeps across it with full force. The passage through the reef is marked on either side by breakers. During kona storms, breakers extend across the passage. Boats entering the harbor should start their approach midway between the breakers and steer for the opening in the seawall of the boat lagoon. Caution should be exercised as there are no navigation aids, and numerous coral heads and submerged rocks are on both sides of the channel. The village of **Pukoo** consists of a few houses on the lowland near the beach in front of a steep-sided gorge that extends well back into the mountain. The reef at Pukoo extends 0.6 mile offshore.

Chart 19347.–There are many old fishponds in the vicinity of Pukoo and along the coast for 10 miles W. About 1 mile W of Pukoo is the village of **Kaluaaha,** where two church steeples may be seen above the trees.

Kalaeloa Harbor, 3.2 miles W of Pukoo Harbor, is the largest and best protected harbor along the coast, but its use is limited by the bar across the entrance, which is an unmarked opening in the reef. A light is on the SE point of the diamond-shaped peninsula on the NE side of the harbor.

Chart 19353.–Kamalo Harbor, 5 miles SW of Pukoo Harbor, is a pocket opening S in the reef at the most S point on Molokai. The harbor, excluding the entrance, is about 150 yards wide, and extends more than 0.5 mile into the reef. The entrance, about 90 yards wide, has a bar with a general depth of 10 feet, although it is possible to carry 19 feet into the harbor through a channel with a least width of 30 yards. A shoal covered 6 feet is 50 yards N of the entrance. A lighted buoy is off the entrance. The coral reefs marking the limits of deep water within the harbor are easily seen by day. The village of **Kamalo** consists of a few houses at the mouth of a gulch back of the harbor. The ruins of an old wharf are at the head of the harbor.

Kamalo Harbor offers good protection during all weather. The harbor is used by small boats, but seldom by larger vessels. The swell is not felt within the harbor. Current observations a mile off Kamalo show velocities of about 1 knot.

Chart 19351.–Puu Papai, 830 feet high, is 2 miles NW of Kamalo Harbor and 0.6 mile inland. Deep **Kamalo Gulch** is a mile E of the hill and 2.5 miles W of the hill is **Kawela Gulch,** which extends well inland from the small village of **Kawela.**

From Kamalo Harbor the coast has a W trend and the reef extends as much as 1 mile from shore.

Chart 19353.–Kaunakakai Harbor, 9 miles W of Kamalo Harbor and 16 miles from the W extremity of Molokai, is a commercial barge harbor in the reef off **Kaunakakai.** The harbor is open to the S. In September 1979, the harbor basin had a controlling depth of 19 feet; its dimensions are about 600 feet by 1,500 feet. Channel markers include lighted and unlighted buoys and a **034°** lighted range.

The State-owned wharf, with a light at the SW corner, provides a cargo shed and 680 feet of berthing space. Two 8-ton cranes are on the W side of the wharf. A 700-yard-long mole extends NE from wharf to shore. The mole protects small craft from the trade winds. Barges can lie at the wharf except during the two or three severe kona storms of the winter season; Kamalo Harbor offers better protection for small craft during the konas. Water is piped to the wharf; gasoline and diesel fuel can be delivered by tank truck. Some marine supplies may be obtained in Kaunakakai.

A landing pier and mooring area for small craft are just off the N end of the wharf; the controlling depth is 8 feet. A channel, marked by a private buoy and daybeacons, leads to a small-boat harbor off the SE side of the wharf. With local knowledge, 10 feet can be carried into the harbor. The SE side of the channel and E side of the harbor are extremely shoal; caution is advised. The harbor is protected on its E side by a detached breakwater.

The coastal reef extends more than a mile from shore on both sides of the Kaunakakai entrance. Vessels can anchor temporarily in depths of about 15 fathoms off the entrance, but there is little shelter from the NE trades or the konas.

Current observations a mile off Kaunakakai indicate an E set most of the time. Maximum velocities observed were 1 knot E and 0.5 knot W. E and W maximums occur at about the times of low water and high water, respectively, at Honolulu.

Chart 19351.–For 3 miles W from Kaunakakai the lowlands extend much farther inland than along any other section of the coast. The reef extends more than a mile from shore and is mostly covered 1 to 3 feet, but has many coral heads that bare at low water. The country between Kaunakakai and Kolo is bare and rocky and is cut by numerous small gulches. The sandy beach is fringed with algaroba trees.

The aerolight of Molokai Airport and the aero obstruction lights on the surrounding hills are visible off the S shore of the island.

Chart 19353.–Kolo Harbor, about 10 miles W of Kaunakakai, is a large pocket in the reef with a narrow entrance from S. Two private white markers on shore about 300 yards W of Kolo wharf provide a **007°** range, which marks the channel through the reef. The channel and the harbor have depths of about 8 feet; the harbor is subject to shoaling. A moderately heavy swell causes heavy surf on the entrance bar, and the combination of surf and current often creates a hazardous condition. Kolo Harbor affords anchorage with limited swinging room, but the swell is felt even though its full force is broken by the outer reefs. The harbor is not recommended for strangers. The ruins of an old wharf are at the head of the harbor.

Chart 19351.–From Kolo Harbor W to Laau Point, the coast is low and has a narrow sand beach, broken here and there by short stretches of rocky shore. The coral reef gradually becomes narrower until it disappears at Laau Point.

Haleolono Point, 13 miles W of Kaunakakai and 3.5 miles E of Laau Point, is a conspicuous brown bluff, 50 feet high, that extends 0.2 mile along the water's edge.

Chart 19353.–Lono Harbor, a barge harbor at Haleolono Point, is protected by two breakwaters; the entrance channel is 12 feet deep and is marked by a **346°** private unlighted range. The 500-foot-square harbor basin is 18 feet deep. The harbor has a 260-foot wharf, and fixed moorings provide an additional 680 feet of berthing space. Private facilities are available for bulk-handling and storage of sand and cinders. Local knowledge is advisable for entering.

Chart 19351.–Waieli is a prominent, bare hill, 625 feet high, 1 mile NE of Haleolono Point. The hill is being quarried.

Laau Point, the SW extremity of Molokai, is low and rocky; the 10-fathom curve is about 0.5 mile offshore. **Laau Point Light** (21°06.2'N., 157°18.5'W.), 151 feet above the water, is shown from a 20-foot pole with a diamond-shaped red and white daymark on a bluff near the point. The prevailing current off Laau Point is N, and vessels are cautioned against a set onto the point.

Penguin Bank, an extensive shelf, makes out from the W end of Molokai in a general WSW direction for a distance of 28 miles from Laau Point. The bank is fairly flat and consists of sand and coral at depths of 21 to 30 fathoms. Along the N, W, and S edges, the bank drops off very abruptly into depths of more than 100 fathoms.

In the vicinity of Laau Point currents are strong and likely to be erratic. Usually flowing along the W part of the S coast of Molokai is a W current that turns sharply to the N as it rounds the point. A strong tide rip W and N of the point forms breakers when the wind is N. A NE set over Penguin Bank joins the N current along the W coast of Molokai. This current is not felt in the deep water W of Penguin Bank but is apparent at the edge of the bank when passing inside the 100-fathom curve. There is no apparent connection between this current and the tides, and the trade winds appear to have little effect upon it, although it appears to be stronger or weaker according to whether there is a barometric depression N or S of the islands.

Between Laau Point and Ilio Point, a distance of about 8 miles, the W coast of Molokai is bare, low, and rolling, and cut up by a few small gulches. The beach is marked by low bluffs and short stretches of sand, back of which the land rises gently.

Ilio Point, 8 miles from Laau Point, is the NW extremity of Molokai. Breakers have been observed about 0.3 mile off Ilio Point during heavy weather. A 293-foot hill is 0.8 mile inland. During the trades, small craft can find fair anchorage 1.5 miles S of the point.

The N coast of Molokai is mostly bold, but deep-draft vessels should not stand close to the shore. This N coast has no harbor or anchorage that affords shelter in all winds. Kalaupapa is the only port of call for local vessels.

Mokio Point, 3 miles E of Ilio Point, is a low, rocky bluff with a detached rock just offshore.

Five miles E of Ilio Point is **Hauakea Pali,** a low cliff that extends inland at right angles to the beach. The seaward end resembles a large, white sandbank and is the most conspicuous landmark in the vicinity. The cliff is the W boundary of the low plain that extends across the island.

E of Hauakea Pali the coastal bluffs gradually rise to precipitous cliffs which are 2,000 to 3,000 feet high in some places.

Kalaupapa Peninsula, 16 miles E of Ilio Point, is a low point of land that juts out 2 miles from the face of a high cliff. **Molokai Light** (21°12.8'N., 156°58.3'W.), 213 feet above the water, is shown from a 138-foot white octagonal pyramidal tower on the outer part of the peninsula. There is deep water close to the peninsula except for the marginal reef just N of Kalaupapa.

Kalaupapa on the W side of Kalaupapa Peninsula is the commercial barge harbor for the leper colony which occupies the peninsula. Special permit is required to land unless on State business. This open harbor has a small breakwater on the N side. The State landing provides 56 feet of berthing space and has depths of 2 to 4 feet alongside. Access is good, and no channel is needed to reach open water. A **109°** range is lighted when required. Anchorage can be found in depths of 12 fathoms 0.2 mile off the landing.

Chart 19347.–The country between Kalaupapa Peninsula and Cape Halawa has a very irregular and jagged appearance and is more or less covered with vegetation. The coastal cliffs are broken by headlands, bights, and deep gulches. There are no landing places other than the few debris piles in front of the cliffs and the few level spots in the mouths of the gulches.

Kalawao, on the SE side of Kalaupapa Peninsula is a part of the leper colony.

Mokapu Island, 360 feet high, is 3 miles SE of Molokai Light and 0.7 mile offshore. The island is the outermost of two; **Okala Island,** 370 feet high, is close to shore.

Pahu Point, 5 miles SE of Molokai Light, is a bold, pyramidal headland 1,022 feet high. The point is the seaward end of a sharp ridge that extends inland along the W side of a deep gulch. **Mokolea Rock,** over which the sea always breaks, is 0.6 mile NE of the point.

Umilehi Point, a mile E of Pahu Point, is particularly conspicuous and appears to be a small crater with the entire seaward side blown out. **Mokohola Island,** 20 feet high, is a dark rock 0.3 mile off Umilehi Point.

The E half of Molokai's N coast is noted for its rugged scenery and high waterfalls. **Papalaua Falls,** 10 miles E of Kalaupapa Peninsula and 5 miles W of Cape Halawa, start from an elevation of about 2,000 feet at the head of a deep gulch and have a 500-foot drop in one place.

Halawa Bay is between **Lamaloa Head,** an 837-foot cliff, and **Cape Halawa,** the E extremity of Molokai. The bay, which is about 1.5 miles wide between Lamaloa Head and Cape Halawa extends about 0.7 mile inland, affords no shelter from the trades, but indifferent anchorage can be found in depths of 5 fathoms about 0.3 mile from the head. The shores of the bay are mostly backed by high cliffs; there are two black rocks close to the S shore.

Halawa consists of a few houses at the mouth of a deep gulch on the SW side of Halawa Bay. The gulch penetrates W, and a waterfall is visible a mile from the mouth. A triangular cliff, 300 feet high, is conspicuous about 0.5 mile E of Halawa.

Chart 19340.–Kaiwi Channel, between Molokai and Oahu, is about 22 miles wide and is clear of obstructions. A general N drift is reported over Penguin Bank and in the vicinity of Laau Point; elsewhere in the channel the currents appear variable, depending mainly upon the direction and velocity of the wind. The trade winds that follow the N and S shores of Molokai draw across Kaiwi Channel toward Makapuu Point.

Chart 19357.–Oahu Island, 22 miles WNW across Kaiwi Channel from Molokai, has an area of 604 square statute miles and is third largest of the eight major islands. Oahu measures 39 nautical miles SE-NW between Makapuu and Kaena Points and 26 miles S-N between Barbers and Kahuku Points. The island has two prominent mountain ranges, and its skyline is rough and jagged.

Koolau Range parallels the NE coast for nearly its entire length. The part of the range between Makapuu Point and Kaneohe Bay has on its seaward side a sheer, rocky cliff, or pali, nearly 2,000 feet high in some places. NW of Kaneohe Bay, the cliffs give way to steep, rugged slopes. From offshore, the NW half of the range appears as a long ridge, sloping gradually downward, and ending in low bluffs near Kahuku Point. The crest of the ridge and about half the seaward slope are wooded; the lower part of the slope is grass-covered. The entire range has a very jagged appearance and is cut up on its inland side by deep gorges and valleys. The greatest elevation in Koolau Range is at **Puu Konahuanui,** 3,150 feet high and 5 miles back of Honolulu; the peak is on the E side of Nuuanu Valley and overlooks the famous **Nuuanu Pali** at the head of the valley. Two miles closer to Honolulu is **Tantalus,** a rounded peak, 2,013 feet high, with a heavily wooded summit. On the seaward side of Koolau Range the land is mostly low and rolling; it is cut by a few sharp hills, and is under cultivation.

Waianae Mountains parallel the SW coast for nearly the entire distance between Kaena and Barbers Points. Several spurs extending from the range toward the shore form short valleys. The range has numerous high peaks; **Kaala,** 4,046 feet high, is the highest.

Between the two mountain ranges is an extensive plain which extends from Pearl Harbor on the S to Haleiwa on the N; the plain rises to an elevation of about 1,000 feet at Wahiawa. There are low, flat, coastal plains between Honolulu and Barbers Point, in the vicinity of Waianae, Haleiwa, and Kahuku Point, and between Kaneohe Bay and Waimanalo. The greater part of these plains is under cultivation, principally in sugarcane.

Prominent headlands on Oahu are Makapuu Point, Koko Head, Diamond Head, Kaena Point, Kahuku Point, Kualoa Point, and Mokapu Peninsula. The entire coast of the island is fringed with coral reefs 0.5 to 1 mile in width, except along parts of the W shore between Barbers Point and Kaena Point. From Kaena Point to Kahuku Point, the reefs are not so continuous as along other parts of the island.

Harbors and ports.–The largest harbors on Oahu are Kaneohe Bay and Pearl Harbor; the latter is a prohibited area. Honolulu is the only commercial deepwater harbor on the island. Small-craft harbors include Maunalua Bay, Honolulu's Ala Wai Boat Harbor and Kewalo Basin, Waianae Harbor, and Waialua Bay. The NE coast is exposed to the trade winds during most of the year, and the only small-craft shelter available is in Kaneohe Bay.

Currents.–The currents around Oahu depend largely upon the winds and are variable in velocity and direction. The general tendency is a W or N flow along the coast. Tidal currents and eddies are noticeable in some places.

Weather.–Thanks largely to the marked marine influence and the persistent trade winds, the climate of Oahu is unusually pleasant for the Tropics. Records for downtown Honolulu, on the leeward side of the island, show a lowest temperature of 56° F and a highest of 93° F. In some parts of the Koolau Range the annual rainfall is as much as 300 inches; at Honolulu the average is 22 inches. The driest region is the SW where rainfall drops to below 20 inches a year.

Supplies and repairs.–All kinds of supplies are available at Honolulu, and medium-size vessels can be handled for repairs.

Communications.–Oahu has a good network of hard-surfaced highways. Air and sea transportation is available from Honolulu to the other islands and to the mainland.

Honolulu is the only port in the Hawaiian Islands that maintains a commercial radio communication watch.

Chart 19358.–Makapuu Head, the E extremity of Oahu, is a bold, barren, rocky headland 647 feet high. **Makapuu Point Light** (21°18.8′ N., 157°39.1′ W.), 420 feet above the water, is shown from a 46-foot white cylindrical concrete tower on the head.

The seaward side of Makapuu Head is a dark cliff; the inland side slopes rapidly to the valley which separates it from the Koolau Range. The headland is the landfall for vessels inbound to Honolulu from the mainland.

There is deep water close to the outer end of the headland, but shallower water is found along the N and E sides. Deep-draft vessels should give Makapuu Head a berth of about a mile and or stay in depths greater than 20 fathoms.

The **restricted area** of the Makai Undersea Test Range extends NW and NE from Makapuu Point. (See 207.807, chapter 2, for limits and regulations.)

Koko Crater, 2.6 miles SW of Makapuu Head and 0.5 mile from the beach, is a sharp, brown cone 1,204 feet high. The coast between Makapuu Head and Koko Crater is low sand, rock, and shingle; from Koko Crater to Koko Head the coast is rocky, precipitous, and somewhat irregular.

Hanauma Bay, 3.5 miles SW of Makapuu Head, is 0.3 mile wide and extends 0.5 mile inland. The waters off the entrance are very choppy during E winds, but the bay does afford good shelter for small craft in all weather except during E winds. Across the head of the bay is a sand beach that is fringed by 150 yards of coral reefs. Back of the beach is a steep bluff up which a paved road leads to the highway. The bay is a popular camping, picnic, and bathing area. The State of Hawaii has established an underwater park in the bay.

Koko Head, 4 miles SW of Makapuu Head, is a bold promontory 640 feet high; the seaward side is precipitous, the top is flat, and it slopes off rapidly on the inland side. The headland is partly wooded on its lower W slopes, but its general appearance is mostly brown and barren. There is deep water close to Koko Head. Strong W currents have been reported offshore.

Maunalua Bay is an open bight that extends W from Koko Head to Diamond Head; coral reefs fringe most of the shore. On the W side of Koko Head, a channel, marked by a light and private daybeacons, leads through the reef to a private marina in Kuapa Pond and to a public launching ramp behind the reef. The channel has a least depth of 5 feet, except at the entrance where it shoals to a depth of 3 feet on the E side near Daybeacon 2. Behind the Koko Head reefs is one of the few anchorages that offer small-craft shelter in all weather except kona storms. Although depths are 13 feet, only small craft familiar with the area should venture behind the reefs. Tidal currents in Maunalua Bay flood W and ebb E; slack waters occur at about the times of high and low waters at Honolulu.

Caution.–Vessels approaching Honolulu from the E at night should not mistake the lights between Koko Head and Diamond Head for the lights of Waikiki Beach. Commercial and residential development of the coast along Maunalua Bay has resulted in an increase of background lighting. Vessels have mistaken Makapuu Point Light for Diamond Head Light and run aground on the reef W of Koko Head.

Wailupe, 2.7 miles W of Koko Head, is a residential area with a seawall and private piers. A channel, reported dredged to 12 feet, leads through the reefs to Wailupe. Several pipes mark the W side of the entrance channel.

Diamond Head, 9 miles WSW of Makapuu Head, is an extinct volcano 761 feet high. The steep slopes and the top of the crater are bare and brown; the base is brush covered. **Diamond Head Light** (21°15.5′N., 157°48.7′W.), 147 feet above the water, is shown from a 55-foot white pyramidal concrete tower near the beach. A special radio direction finder calibration station is at the light. (See Light List for operational information.) A lighted buoy is moored in 150 feet of water 0.6 mile off the light. Currents setting in various directions with velocities up to 1 knot were noted about 3 miles SW of Diamond Head.

Chart 19364.–The low coast between Diamond Head and Honolulu Harbor is thickly developed, and palm trees are numerous. Along this stretch is world-famous **Waikiki Beach** with its big hotels, surfboarding, outrigger canoe races, and sunbathers. The Waikiki Shore Water Restricted Zone is an area extending about 0.4 mile offshore along Waikiki Beach. Boating is prohibited in this area, except by permit issued by the Harbors Division, Hawaii Department of Transportation.

A **special anchorage** is in **Kapua Entrance,** about 0.9 mile S of Waikiki Beach. (See 110.1 and 110.128d(d), chapter 2, for limits and regulations.)

Ala Wai Boat Harbor is 2.5 miles NW of Diamond Head Light. A dredged channel leads from Mamala Bay through the reefs to the basins inside the harbor. In 1967, the channel was dredged to 22 feet. Depths inside the harbor are 8 to 20 feet. The entrance to the channel is marked by lighted buoys and private daybeacons. Private daybeacons and a 013°30′ lighted range mark the channel.

During the trades, the winds within the harbor are distorted by the nearby tall buildings. Vessels maneuvering in the harbor under sail should beware of sudden changes in the direction and velocity of the wind. The harbor can be entered in all weather except during kona storms.

It was reported in 1975, that many unmarked vessels anchor in the harbor, and entry at night could be dangerous.

The harbor is one of the most popular places for small-boat activity on Oahu, and yacht clubs in the harbor are the host for the famed transpacific yacht race. The harbor attendant controls the berthing and mooring facilities.

Marine supplies and complete repair facilities are available in the harbor including a sailmaker, radio repairs, and a marine railway that can handle craft up to 45 feet.

Storm warning signals are displayed. (See chart.)

Kewalo Basin, 3.5 miles NW of Diamond Head Light, is used exclusively by cruise boats, and charter and commercial fishing vessels. A dredged channel leads from Mamala Bay through the reefs to the basin. The channel has a controlling depth of 19 feet. Depths in the basin are from 18 to 22 feet for the most part with shallow depths of less than 4 feet along the edges of the entrance channel. The channel is marked by lighted and unlighted buoys and a **034°45'** lighted range.

At times when kona winds create high swells, the channel becomes extremely hazardous. When the channel is hazardous, a quick flashing red warning light is displayed atop a 55-foot telephone pole on the E entrance mole.

On the NW side of the basin are a cannery and a shipyard; the marine railway at the shipyard can handle shallow draft vessels up to 92 feet long, or shorter vessels up to 8½ feet in draft. A harbor attendant controls the basin facilities.

Storm warning signals are displayed. (See chart.)

Charts 19367, 19364, 19362.–Honolulu Harbor is 5 miles NW of Diamond Head and midway along the S coast of Oahu; the harbor is protected from all winds and is usually free of surge. **Honolulu** is the capital and the principal deepwater port of the State of Hawaii.

Prominent features.–Honolulu Harbor Entrance Light (21°17.9'N., 157°52.3'W.), 95 feet above the water, is shown from an orange and white banded flagpole type tower on the SE point of the entrance channel. The flashing green light can be easily identified against the background of Honolulu lights. Aircraft warning lights mark the upper and middle levels of the tower.

Sand Island, which borders the seaward side of Honolulu Harbor, is Government-owned and has been built up mostly from harbor dredging. The Coast Guard base is on the NE side of the island.

Aloha Tower, a 193-foot cream-colored, square clock tower on Pier 10, is one of the most conspicuous objects in the harbor. The tall, square, twin white office buildings 300 yards E of Aloha Tower are prominent and provide an excellent reference to ships approaching the harbor by day. Another distinctive mark is the pineapple-shaped tank 0.7 mile NW of Aloha Tower; the tank has a top elevation of 199 feet. **Punchbowl Hill,** 500 feet high and flat topped, is 1 mile inland from Aloha Tower. The horizontal blue lights of the Ala Moana Tower restaurant (21°17.8'N., 157°50.7'W.), 1.5 miles E of Honolulu Harbor entrance, are easily distinguished at night and provide an excellent navigation aid.

Caution.–Vessels approaching the harbor from the W at night should not mistake the lights between Pearl Harbor and Honolulu for the lights of Honolulu, or the lighted buoys off Kalihi Channel for the lighted buoys off the main entrance. Vessels have mistaken these lights and gone aground off Keehi Lagoon. From the E the lights N of Diamond Head should not be confused with those of Honolulu, or the lighted aids of Kewalo Basin with those of Honolulu Harbor. Also from the E, vessels should not mistake the lights between Koko Head and Diamond Head for the lights of Waikiki Beach. Commercial and residential development of the coast along Maunalua Bay has resulted in an increase of background lighting. Vessels have mistaken Makapuu Point Light for Diamond Head Light and run aground on the reef W of Koko Head.

COLREGS Demarcation Lines.–The lines established for Mamala Bay are described in 80.1420, chapter 2.

Channels.–A Federal project provides for a 40-foot Honolulu Entrance Channel from **Mamala Bay,** thence 35 feet in the main harbor basin. The project also provides for a 35-foot channel leading from seaward in Mamala Bay through Kalihi Channel on the W side of Sand Island to Kapalama Basin. The connecting channel between main harbor basin and Kapalama Basin also has a 35-foot project depth. (See Notice to Mariners and the latest editions of charts for controlling depths.)

Honolulu Entrance Channel is marked by lights, buoys, and a **028°** lighted range. The rear light and marker of the range is sometimes obscured when large ships are moored at Berth 8. **Kalihi Channel** is marked by lights, buoys, and a **007°** lighted range.

The John H. Slattery (Sand Island) highway bridge over the harbor end of Kalihi Channel has a bascule span with a clearance of 15 feet. (See 117.900, chapter 2, for drawbridge regulations and opening signals.)

Anchorages.–Recommended anchorage, except during strong kona winds and within at least 600 yards on either side of an underwater sewer outfall line that extends from a point on Sand Island in 21°18'13.7"N., 157°53'14.0"W., thence to 21°17'00.6"N., 157°54'06.0"W., thence to 21°16'56.0"N., 157°54'31.0"W., and thence to 21°16'59.2"N., 157°54'43.1"W., is in depths of 12 fathoms, sand and coral bottom, in Mamala Bay between the seaward ends of the two deepwater channels. Anchorage is not practical in the harbor basins because of the limited swinging room. An **explosives anchorge** is 1.3 miles W of the entrance to Kalihi Channel. (See 110.1 and 110.235, chapter 2, for limits and regulations.)

Tides.–The mean range of tide is 1.2 feet, and the diurnal range of tide is 1.9 feet at Honolulu. Daily predictions for Honolulu are given in the Tide Tables.

Currents.–It is reported that a tidal current floods W and ebbs E along the coast between

BEST DOCUMENT AVAILABLE

Makapuu Point and Honolulu. In the vicinity of Honolulu, an E counterflow along the edge of the reef is reported to accompany the W flood. Strong W currents have been reported off Honolulu. Currents setting toward all four quadrants and having velocities up to 1 knot have been noted about 3 miles SW of Diamond Head.

Tsunamis (seismic sea waves).–The size of a predicted tsunami cannot be estimated in advance. Most of them felt in Honolulu Harbor have been relatively small; the largest of record was 10 feet high, in 1960. However, it is prudent to anticipate that even greater ones may strike.

Honolulu Harbor authorities require all ships to vacate the harbor prior to the estimated time of arrival of a sea wave if possible. If a long engine-warmup is necessary, it should be started at the first alert so the vessel may be ready to proceed in time.

Telephone notification will be given by the Captain of the Port to vessel agents who must, in turn, notify their respective ships. Messengers will be used to the extent available to supplement the telephone warnings.

When ready to depart, each ship should obtain clearance from the harbormaster. The Aloha Tower, traffic control, may be contacted by telephone (808-548-2359), or voice radio on VHF-FM channel 16 (156.80 MHz), call sign, KFQ-907; after calling, the ship will be instructed to shift to the working frequency of channel 12 (156.60 MHz).

The **harbormaster** will assign the exit channel and time of departure, in accordance with assigned priorities and in consideration of the time each vessel becomes ready to move. The assigned priorities for vessels ready to depart are: Government vessels, passenger vessels, tankers, vessels with explosive cargo, and freighters.

Vessels unable to move in time should take adequate precautions against damage during the tsunami due to the expected rise and fall of the water.

(See discussions of tsunamis at beginning of this chapter and in chapter 1.)

Weather.–The climate of Hawaii is unusually pleasant for the tropics. Its outstanding features are (1) the persistence of the trade winds, where not disrupted by high mountains; (2) the remarkable variability in rainfall over short distances; (3) the sunniness of the leeward lowlands, in contrast to the persistent cloudiness over nearby mountain crests; (4) the equable temperature from day to day and season to season; and (5) the infrequency of severe storms.

The prevailing wind throughout the year is the NE trade wind, although its average frequency varies from more than 90 percent during the summer to only 50 percent in January.

Annual rainfall in the Honolulu area averages less than 30 inches along the coast (25 inches at the airport, 24 inches in the downtown area), but increases inland at about 30 inches a mile. Parts of the Koolau Range average 300 inches or more a year. This heavy mountain rainfall sustains extensive irrigation of cane fields and the water supply for Honolulu. E (windward) of the Koolaus, coastal areas receive 30 to 50 inches annually; cane and pineapple fields in central Oahu get about 35 to 40 inches. Oahu is driest along the coast W of the Waianaes where rainfall drops to about 20 inches a year. However, variations from month to month and year to year are considerable; more so during the cooler season, when occasional major storms provide much of the rain, than in the summer, when rain occurs primarily as showers that form within the moist trade winds as they override the mountains. Thus, March rainfall at Honolulu Airport has ranged from more than 20 inches to as little as 0.001 of an inch. In the mean, about half of the airport's annual total occurs during its 3 wettest months, December through February. Trade-wind rainfall is more frequent at night. Daytime showers, usually light, often occur while the sun continues to shine, a phenomenon referred to locally as "liquid sunshine."

Hawaii's equable temperatures are associated with the small seasonal variation in the amount of energy received from the sun and the tempering effect of the surrounding ocean. The range in temperature averages only 7° between the warmest months (August and September) and the coolest months (January and February) and about 12° between day and night. Daily maximums run from the high 70's in winter to the mid-80's in summer, and daily minimums from the mid-60's to the low 70's. However, the Honolulu Airport area has recorded as high as 93°F and as low as 52°F.

Average water temperatures at Waikiki Beach vary from 75°F in the morning to 77°F in the afternoon during March, and from 77°F in the morning to 82°F in the afternoon during August.

Because of the persistence and moderate humidity of the NE trade winds, even the warmest months are usually comfortable. But when the trades diminish or give way to S winds, a situation known locally as "kona weather" ("kona storms" when stormy), the humidity may become oppressively high.

Weather severe enough to interfere with shipping or travel is uncommon. Intense rains of the October to April "winter" season sometimes causes serious, but local, flash flooding. Thunderstorms are infrequent and usually mild, as compared with those of the midwestern United States. Hail seldom occurs, and when it does it is small and rarely damaging to crops. At great intervals a small tornado or a waterspout moving onshore may do some slight damage. Four hurricanes have struck Hawaii since 1950, but several times that many, and a number of less intense tropical cyclones, most of them drifting W from their breeding grounds off the Mexican coast, have approached near enough for their outlying winds, clouds, and rain to affect the islands.

The National Weather Service office is at the airport; **barometers** may be compared there or by telephone. (See appendix for address.)

(See page T-11 for **Honolulu climatological table.**)

Storm warning signals are displayed. (See chart.)

Pilotage.–This is compulsory for all foreign vessels and U.S. vessels under register in foreign trade; it is optional for U.S. vessels in coastwise trade with a Federal licensed pilot on board. The pilot boat, IKAIKA, is yellow and 37 feet long with the word PILOT in black letters on the side of the house. The boat displays the International Code flag "H". The pilot boarding station is about 1 mile seaward of the sea buoy on the entrance channel rangeline.

The pilot station at Aloha Tower monitors VHF-FM channel 16 (156.80 MHz) and channel 12 (156.60 MHz); channel 12 and channel 9 (156.45 MHz) are the pilots working frequencies.

Mariners are requested to give at least 24 hours advance notice of arrival by telephone (808-537-4169) or by calling "HONOLULU PILOTS" on VHF-FM channels 16 or 12; call sign, WXZ-456. Additionally, mariners are requested to give gross tonnage, length, and draft of the vessel. The pilot ladder should be rigged 3 feet above the water on the lee side. Vessels should maintain a speed of not more than 5 knots.

In addition to the above, the State of Hawaii has established **special pilotage regulations** for all **tankers, tanker barges,** and **tankerlike vessels.** In general the regulations require these vessels to have on board a Honolulu Port Pilot when entering or departing Honolulu Harbor for any reason. Exempt from this requirement are tankerlike vessels and vessels towing tanker barges when under the control and direction of a person duly licensed as a pilot by the U. S. Coast Guard for the Port of Honolulu, and tankers when departing from anchorage. A copy of the rules and regulations affecting such vessels may be obtained from the Department of Transportation of the State of Hawaii, Harbors Division, Honolulu, or at the office of the harbormaster.

Towage.–Tugs up to 3,300 hp are available in Honolulu. Salvage equipment is also available.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Honolulu is a **customs port of entry.**

Coast Guard.–A Coast Guard base is on the NE side of Sand Island. A Marine Safety Office is in Honolulu. (See appendix for address.)

Harbor regulations are established by the Harbors Division, Hawaii Department of Transportation, and are enforced by the harbormaster. Prior to entry, vessels equipped with VHF-FM radio should establish communications with Aloha Tower traffic control on channel 16 (156.80 MHz), then shift to channel 12 (156.60 MHz) working frequency. **Traffic control** in Honolulu is controlled by means of orange ball and orange cone signals on the yardarm on Aloha Tower by day and by amber lights on the tower at night. The lower light, showing fixed, is 143 feet above the water; the upper flashing light is 152 feet above the water. The lights are visible 5 miles from 320° to 062°. Traffic signals are: by day, ball hoisted at yardarm, incoming traffic only; cone hoisted at yardarm, outgoing traffic only; ball and cone hoisted at yardarm, harbor closed to all traffic; by night, flashing light on, incoming traffic only; fixed light on, outgoing traffic only; both lights on or no lights showing, harbor closed to all traffic. When no day signals are shown the harbor is closed for traffic of vessels over 500 gross tons. It is the invariable custom to display the ball on the E, or Waikiki side of the yardarm and the cone on the W, or Ewa side of the yardarm. To pass visual messages, contact Pearl Harbor Navy Signal Tower, call H-1.

The **speed limit** in Honolulu Harbor is 5 knots for all vessels and tows and 10 knots for motorboats, and other small craft.

A flashing amber warning light, privately maintained and shown about 22 feet above the water from a pole about 70 yards SSW of Pier 38, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

Wharves.–Honolulu has over 60 piers and wharves around its harbor waterfront. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths for the facilities described are reported; for information of the latest depths, contact the State of Hawaii, Department of Transportation, Harbors Division or the private operators. All facilities have direct highway connections. Water and electric shore power connections are available at most piers and wharves.

General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. A 200-ton mobile crane can be rented. Numerous warehouses and cold storage facilities adjacent to the waterfront are available.

State and privately owned pipelines are available for petroleum products, liquid fertilizers, and molasses.

Except where noted, most of the piers and wharves are owned by the Department of Transportation, Harbors Division.

Piers 1 and 2: bulkhead wharf on E side of entrance channel; 2,967 feet long, 40 feet alongside; deck height, 7 feet; cranes up to 33 tons, straddle carriers for containers; 335,000 square feet covered storage, open storage for 3,500 containers; receipt and shipment of general and containerized cargo, receipt of petroleum products, shipment of molasses; bunkering vessels; operated by Matson Terminals, Inc.

Aloha Tower Berths: Berth 8, 615 feet long; Berth 9, 624 feet long; Berths 10 and 11, 974 feet long; 35 feet alongside; deck height, 7 feet; 320,000 square feet of covered storage; receipt and shipment of general cargo; passengers; bunkering vessels; operated by Department of Transportation, Harbors Division.

Berth 19: 530 feet long; 35 feet alongside; deck height, 6½ feet; 128,000 square feet of covered storage; two electric traveling bulk sugar loading towers; receipt and shipment of general cargo, receipt of automobiles, shipment of bulk raw sugar and molasses; bunkering vessels; operated by Department of Transportation, Harbors Division.

Berth 20: 460 feet long; 35 feet alongside; deck height, 6½ feet; 100,000 square feet of covered storage; two electric traveling bulk sugar loading towers; receipt and shipment of general cargo, receipt of automobiles, shipment of canned pineapples; bunkering vessels; operated by Department of Transportation, Harbors Division.

Berths 22–23: 830 feet long; 33 feet alongside; deck height, 6 feet; 23,000-ton grain elevator; receipt of grain; operated by Hawaiian Grain Corp.

Berths 24–25: 923 feet long; 30 feet alongside; deck height, 6 feet; 110,000 square feet of covered storage; receipt and shipment of general and containerized cargo and cattle; operated by Young Brothers Ltd.

Berth 26: 685 feet long; 30 feet alongside; deck height, 6 feet; 35,000 square feet of covered storage; receipt and shipment of general and containerized cargo and cattle; operated by Young Brothers Ltd.

Berth 27: 760-foot-long face, 150 feet E side; 35 feet alongside; deck height, 7 feet; 63,000 square feet of covered storage; receipt and shipment of general cargo, receipt of lumber; operated by Department of Transportation, Harbors Division.

Berths 28, 29A, and 29: 1,240 feet long; 34 to 35 feet alongside; deck height, 7 feet; 103,000 square feet covered storage; receipt and shipment of general cargo and petroleum products; bunkering vessels; operated by Young Brothers Ltd.

Berth 30: 270 feet long; 34 feet alongside; deck height, 6 feet; receipt and shipment of petroleum products; bunkering vessels; owned and operated by Chevron-U.S.A., Inc.

Berths 31A, 31, 32 and 33: 1,440 feet long, 35 feet alongside; deck height, 7 feet; 335,000 square feet of covered storage; receipt and shipment of general and containerized cargo and petroleum products, receipt of lumber; bunkering vessels; operated by Department of Transportation, Harbors Division.

Berth 34: 336 feet long; 35 feet alongside; deck height, 7 feet; receipt of petroleum products, shipment of bulk cement; operated by Union Oil Co. and Kaiser Cement Corp.

Berth 35: 704 feet long; 35 feet alongside; deck height, 7 feet; two 6½-ton cranes; receipt of fresh pineapples, sand and gravel, shipment of empty containers, bagged fertilizer, and petroleum products; operated by Del Monte Corp., and Libby, McNeill, and Libby.

Pier 36: 62-foot-long face, E and W sides, 546 feet long; 35 feet alongside face and E side, 20 to 12 feet along W side; one 20-ton crane; receipt of pineapples, shipment of empty containers and bagged fertilizers; operated by Dole Co.

Pier 39: 105-foot-long face, 35 feet alongside; E side 1,463 feet long, 16 to 35 feet alongside; W side 1,025 feet long, 35 feet alongside; deck height, 8 feet; 178,000 square feet of covered storage; receipt and shipment of general cargo; bunkering vessels; owned by the U. S. Government; operated by Department of Transportation, Harbors Division, State of Hawaii.

Pier 40: E and W sides 1,005 feet long, 35 feet along E side, 34 feet along W side; face 250 feet long, 30 feet alongside; deck height, 8 feet; cranes up to 40 tons; 133,000 square feet of covered storage; receipt and shipment of general cargo; passengers; owned and operated by U. S. Government.

Pier 51A (21°19′02″N., 157°53′16″W.): 556 feet with dolphins; 40 feet alongside; deck height, 8 feet; receipt of petroleum products; operated by Texaco, Inc.

Foreign-Trade Zone No. 9 and Subzone 9-A are in Honolulu. (See chapter 1, Foreign-Trade Zones, and appendix for address.)

Supplies.–Bunker oils, diesel fuels, and water are piped to most of the piers; gasoline is available at the fuel piers. Marine supplies are available in quantity.

Repairs.–Honolulu has a floating drydock with a lifting capacity of 2,800 tons, length of 345½ feet over the keel blocks, width of 58 feet between wing walls and a maximum width of 84 feet, and a depth of 19 feet over the blocks. A large marine railway is available in the port; lifting capacity 1,400 tons, maximum length 222 feet, maximum width of 63 feet, and maximum depth of 10 feet. The service of a 200-ton mobile crane is available. Machine work can be obtained; a 84-inch lathe with a 44-foot bed is available for this purpose. In an emergency large commercial vessels have been handled at the Pearl Harbor Naval Shipyard.

Communications.–Honolulu is a major port of call for transpacific vessels, and there is commercial barge service to and from the other islands. Air service, passenger and freight, includes scheduled flights to the other islands, to the mainland, and to W and SW Pacific areas.

Chart 19364.–Keehi Lagoon, 6 miles NW of Diamond Head is triangular in shape and is fronted by coral reefs. The cuts through the lagoon are former seaplane landing areas. Kalihi Channel, previously mentioned, cuts through the SE part of the lagoon. A privately dredged channel branches NW from Kalihi Channel to a small-boat harbor and a barge harbor and turning basin on the E side of the landing areas. In 1974, the reported controlling depths were 12 feet in the channel to the turning basin and 15 feet in the basin. The barge channel is marked by a private **334°** lighted range.

Storm warning signals are displayed. (See chart.)

A **special anchorage** is in Keehi Lagoon on the W side of the barge channel. (See 110.1 and 110.128d(c), chapter 2, for limits and regulations.)

Honolulu International Airport, on the N shore of

Keehi Lagoon, is the largest commercial airport in the State. The aerolight on the control tower is prominent from seaward.

Chart 19357.–A low, flat plain, 3 to 5 miles wide, borders the sandy shore between Keehi Lagoon and Barbers Point. The area includes Pearl Harbor and several airfields. W of Pearl Harbor, much of the area is tree-covered or planted in sugarcane.

Pearl Harbor, 9.5 miles WNW of Diamond Head, is a **Defensive Sea Area** established by Executive Order No. 8143 of May 26, 1939. The order says in part:

"The area of water in Pearl Harbor, Island of Oahu, Territory of Hawaii, lying between extreme high-water mark and the sea, and in and about the entrance channel to said harbor, within an area bounded by the extreme high-water mark, a line bearing S from the SW corner of the Puuloa Naval Reservation, a line bearing S from Ahua Point, and a line bearing W from a point 3 miles due S from Ahua Point, has been established as a defensive sea area for purposes of national defense, and no persons (other than persons on public vessels of the United States) are permitted to enter this defensive sea area, and no vessels or other craft (other than public vessels of the United States) are permitted to navigate in this area, except by authority of the Secretary of the Navy."

Permission to enter Pearl Harbor must be obtained in advance from Commander, Naval Base, Pearl Harbor, Hawaii 96860.

Pilotage.–All vessels, except commissioned ships of the U.S. Navy and U.S. Coast Guard, are required to take a pilot when entering or departing Pearl Harbor. Pilots board about 1.3 miles SE of the entrance buoys. All vessels destined for Pearl Harbor must pass through Approach Point PAPA HOTEL (21°16'17"N., 157°56'33"W.). This point, about 2 miles SE of the entrance buoys, is not marked by any navigational aid.

It is requested that ships guard Pearl Harbor Control frequency VHF-FM channel 69 (156.475 MHz), 1 hour before entrance, and continuously thereafter unless guard for this circuitry is arranged after arrival. The voice call of Pearl Harbor Port Control is "Pearl Harbor Control;" ships use own ship's name as voice call. Pearl Harbor Control also guards the Bridge-to-Bridge frequency VHF-FM channel 13 (156.65 MHz).

General description.–There are many prominent features in and around Pearl Harbor. (See chart.) The fan-shaped harbor has an entrance width of 400 yards and a greatest inland extent of 5 miles. The 45-foot entrance channel is marked by lighted and unlighted buoys and by a lighted range. The main basin is divided by two peninsulas and an island into four smaller basins known as **West Loch, Middle Loch, East Loch,** and **Southeast Loch.** Tidal currents are generally weak, but the ebb sometimes exceeds 0.5 knot. A dangerous W set may be experienced in the vicinity of the entrance to Pearl Harbor Channel.

Special anchorages are on the E side of the Pearl Harbor Entrance Channel near Kumumau Point; on the W side of the channel in the lagoon S of Iroquois Point; and in Aiea Bay on the E side of East Loch. (See 110.1 and 110.128d (e) through (h), chapter 2, for limits and regulations.)

Chart 19362.–Barbers Point, 17 miles W of Diamond Head, is the SW extremity of Oahu. The low land back of the rounding point extends 3 miles N to the foothills of the Waianae Mountains; the hill slopes are steep and partly brush covered but the bare soil that shows in places gives them a reddish appearance.

Barbers Point Light (21°18.0'N., 158°06.5'W.), 86 feet above the water, is shown from a 72-foot white cylindrical concrete tower. A reef extends 0.6 mile off the light.

Five miles NE of Barbers Point and 2 miles inland are the prominent chimneys of a sugar mill at **Ewa.** An industrial park is on the point. The towers and flare stacks of an oil refinery are 1 mile NE of the light. A tank is 2.8 miles NNE of the light. A stack and several silos are close NW, and an aerolight is 2 miles ENE of the light.

Two naval **danger zones** and a **restricted area** have been established between Barbers Point and the entrance to Pearl Harbor. (See 204.224a, 204.224b, and 207.806, chapter 2, for limits and regulations.)

A **253°22'–073°22' measured nautical mile** has been established 2.5 miles E of Barbers Point. The front markers are white triangles, with horizontal orange band, on 55-foot posts; the rear markers are white triangles, with vertical orange band, on 70-foot posts.

Offshore pipeline terminal **anchorage and nonanchorage areas** have been established off Barbers Point. (See 110.236, chapter 2, for limits and regulations.)

Currents.–There is a general W current along the coast between Honolulu and Barbers Point. Velocities up to 0.8 knot, setting W, have been measured off the point, and greater velocities have been reported.

Chart 19357.–The coast has a general NW trend between Barbers Point and Kaena Point, a distance of about 20 miles, and consists of alternating ledges of rock and stretches of white sand. Spurs of the Waianae Mountains extend to most of the points. Between the spurs and ridges are heavily wooded valleys that contrast with the rocky and bare mountains. A highway follows the coast from just N of Barbers Point to Kaena Point.

Much of the shoreline is fringed with rocks and reefs, but they are mostly close to the shore. The 3-fathom curve is within 0.5 mile of the shore, and the 10-fathom curve is within 1 mile. Vessels can avoid all outlying dangers by giving the coast a berth of 1 to 1.5 miles. Other than Pokai Bay, there are no harbors or anchorages along the W coast that afford shelter in all winds.

A private barge harbor is about 2 miles NW of Barbers Point. The entrance channel through the reefs and the basin have been dredged to 21 feet. The channel is marked at the entrance by buoys, and by a private unlighted 058° range. Small craft may take shelter in the harbor during an emergency.

A flashing amber warning light, privately maintained and shown from a pole about 22 feet high on the S side of the harbor, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

Kahe Point, 3.5 miles N of Barbers Point, is the seaward end of a mountain spur. A large powerplant is on the point. Two short boulder groins extending from the shore protect the intake of the plant's cooling system. A private light is off the W side of the point.

Nanakuli, 5.5 miles N of Barbers Point, is a homestead areas near the shore.

Puu o Hulu, about 7 miles NW of Barbers Point, is a narrow rocky, barren ridge, 1.5 miles long. A large water tank is on the saddle of the S slope. The ridge is on **Maili Point,** the S of the two important projecting points of this coast, and is the most conspicuous landmark in this vicinity. The W end of the ridge is close to the shore and has an elevation of 856 feet; it is precipitous on its seaward side.

Chart 19361.–**Lualualei Homestead** tracts are N and NE of Puu o Hulu. Two 1,500-foot radio towers are prominent in the valley. **Puu Mailiilii,** about 2 miles N of Puu o Hulu, is a narrow, rocky ridge, 723 feet high, near the shore and approximately at right angles with it.

Low **Kaneilio Point,** 10 miles NW of Barbers Point, projects 0.2 mile from the general coastline. A fish haven consisting of old auto bodies is a mile S of the point. Between Puu o Hulu and Kaneilio Point the light-colored buildings of a limekiln 0.3 mile inland show up against a dark background.

Pokai Bay, on the NW side of Kaneilio Point, is the seaward approach to **Waianae.** Shallow water extends 0.3 mile from the inner shore of the bay. The breakwater extending N from Kaneilio Point and marked at the end by a light, and the opposing boulder groin from the inner shore form a State water recreation area. Piles are about midway between the breakwater and the shore. The area E of the piles is for swimming, and the area between the piles and the breakwater is for outrigger canoes. No person shall operate, anchor or moor any other vessel in the area between the piles and the breakwater except in adverse weather conditions when emergency anchoring is permitted.

Waianae Boat Harbor, 0.5 mile NW of Kaneilio Point, is entered from the SE between two breakwaters. The harbor is protected on the W side by a 1,690-foot-long L-shaped breakwater, marked on its seaward end by a light, and on the NE side at the entrance by a 220-foot-long stub breakwater. A 003°-183° lighted range marks the entrance approach.

Local magnetic disturbance.–Differences of 2° or more from normal variation may be expected in Pokai Bay.

A deep valley extends about 4 miles inland between Puu o Hulu and Lahilahi Point and is the largest valley on this side of the Waianae Range. The broken ridge which makes down to Puu Paheehee divides the valley. **Puu Paheehee,** 652 feet high, is about 1 mile inland from Waianae.

Lahilahi Point, 1.7 miles NW of Kaneilio Point, is a detached, steep ridge of dark rock, 234 feet high. This narrow, conspicuous point, projecting seaward about 0.2 mile, has the appearance of an islet from a distance and is known to local fishermen as **Black Rock.** An apartment building on the beach 250 yards N of the point and a hotel about 1.2 miles NNE of the point are good landmarks.

Kepuhi Point, 13 miles NW of Barbers Point, is a few hundred yards from the seaward end of a bold, rocky, mountain spur.

Chart 19357.–The coastal bight between Kepuhi Point and Kaena Point, 7 miles to the NW, is backed mostly by ridges of the Waianae Mountains. Midway along the bight is a sand beach in front of a small valley; small boats can make beach landings when the sea is smooth and can anchor in depths of 4 to 6 fathoms about 0.2 mile offshore.

Kaena Point, the NW extremity of Oahu, is low and rocky and is only a few hundred yards from the foot of Kuaokala Ridge. **Kaena Point Light** (21°34.7′N., 158°16.9′W.), 65 feet above the water, is shown from a 20-foot white pyramidal concrete tower. Off the end of the point are several low, jagged rocks, over which the sea washes, and breakers extend about 0.4 mile from shore. The 10-fathom curve is 0.8 mile W of the point.

The **danger zone** of a firing area covers a wide sector N of Kaena Point. (See 204.224, chapter 2, for limits and regulations.)

Currents.–A continuous NW current and moderate tide rips are reported off Kaena Point. Observations over a 24-hour period at a location 0.8 mile S of Kaena Point Light show a NW current averaging 0.8 knot; the greatest velocity measured was 1 knot.

The N coast of Oahu trends E for 9 miles from Kaena Point to Waialua, thence NE for another 11 miles to Kahuku Point; rock ledges alternate with stretches of white sand beach. The broad valley back of Waialua spreads to the coastal plain, which narrows as it approaches Kaena and Kahuku Points; most of the valley is cultivated in sugarcane. From Kaena Point to Waialua the mountains have a rugged appearance; from Waialua to Kahuku Point the hills resemble a continuous plateau. A hard-surface highway parallels the coast.

Most of the N coast is fringed with reefs as much as 0.5 mile in width, but all dangers can be avoided by staying at least a mile from shore. Haleiwa Small-Boat Harbor is the only harbor along the N coast.

Kuaokala Ridge, back of Kaena Point, is high, and its seaward end breaks off rather abruptly.

White domes and telemetry antennas are conspicuous along the ridge. The scattered beach houses between Kaena Point and Waialua are backed by cultivated fields that extend to the mountains.

Kaiaka Bay is a small coastal dent 9 miles E of Kaena Point; **Kiikii Stream** and **Paukauila Stream** empty into the head of the bay. Prominent from offshore is the mill stack in **Waialua,** a half mile back of the beach. A depth of 3 feet can be carried halfway into the bay by passing between the **Kaiaka Point** reefs, on the NE side, and the reef in midentrance.

Waialua Bay, a mile NE of Kaiaka Bay, is a small dent at the bend in the middle of the N coast. The bay shores are low, black rock, with sand patches in the bights and fringed by large algaroba trees. The low land back of the beach slopes gently to a tableland with mountain ranges on either side. **Haleiwa** is at the head of Waialua Bay.

Haleiwa Small-Boat Harbor, at the head of Waialua Bay is protected by a breakwater on the W and a mole marked by a light on the E. In June 1979, the midchannel controlling depth in the entrance channel was 12 feet; depths of 6 to 11 feet were alongside the berths. The channel is marked by lighted and unlighted buoys and by a **129°** lighted range. Water is available at most berths, and a launching ramp is in the harbor. The harbor can be entered in all but the most violent storms, at which time good anchorage is found about a mile offshore in 20 to 30 fathoms.

Anahulu River empties into the SW corner of Waialua Bay. River navigation is restricted by the fixed bridge over the mouth; the clearance is 8 feet for a channel width of 14 feet.

The narrow coastal plain between Waialua and Kahuku Point is backed by a vegetation-covered tableland with steep seaward slopes that are cut by deep gorges.

Waimea Bay, 5 miles NE of Waialua, is a small coastal dent at the mouth of the **Waimea River** gorge. The highway bridge over the river can be seen from seaward. A yellow-brown tower and scattered buildings are visible on the N side of the bay.

Wananapaoa Islet, the outer of two ragged masses of black rock off the S point of Waimea Bay, has deep water close to its seaward sides. The submerged rocks near the point on the NE side of the bay are usually marked by breakers.

Waimea Bay affords little shelter, and beach landings can be made only in very smooth weather. There is a wide beach at the head of the bay, but both sides of the entrance are fringed with rocky ledges. Indifferent anchorage is available in depths of 9 or 10 fathoms, sand bottom, 0.3 mile W of the river mouth.

Waialee is 4 miles NE of Waimea Bay. A group of large conspicuous buildings is at the foot of a bluff a few hundred yards inland. Also prominent are two large dish antennas atop a ridge about 1.3 miles SW of Waialee and radome on Mount Kawela about 2 miles SE. Low **Kuilima Point,** 5.4 miles NE of Waimea Bay, has a resort hotel complex on the point.

Kahuku Point, the N extremity of Oahu, is low and sandy; the dunes are partly overgrown with vegetation, and there are few scattered trees. The coast rounds gradually at Kahuku Point, and there are several small black rocks close to shore. The land rises gently from the low bluffs near the point to the mountains of Koolau Range. The 10-fathom curve draws in to within 0.4 mile of the point. The breakers afford sufficient daytime warning of coastal dangers, but the low, unmarked point is difficult to locate at night. Currents off Kahuku Point set W or NW, but are sometimes negligible; tide rips have been reported a mile E of the point.

The coast between Kahuku Point and Makapuu Point, 30 miles to the SE, is known as **Windward Oahu** and is more productive than other parts of the island because of its greater rainfall. Paralleling this coast is the Koolau Range from which several spurs reach shore between Laie Bay and Kaneohe Bay. The shore is low and sandy with patches of black rock outcrop, particularly at the headlands and most of the points. Between the shore and Koolau Range is a narrow strip of cultivated land; this coastal area widens between Kaneohe Bay and Waimanalo and is one of the principal agricultural areas of Oahu. There are good highways along the entire coast.

Nearly all of this NE coast is fringed by coral reefs with little or no water over them at low tide, and the area is exposed throughout most of the year to the sea and swell built up by the NE trades. The numerous small openings in the reefs can be navigated by local craft; wider openings lead to Kahana, Kaneohe, Kailua, and Waimanalo Bays. The 10-fathom curve is no farther than 1.6 miles from shore except in Kaneohe Bay.

Kahuku, 3 miles SE of Kahuku Point, is marked by a mill stack which is a half mile from the beach.

Low **Makahoa Point** projects 0.2 mile from the general coast 3.5 miles SE of Kahuku Point. **Kihewamoku,** an islet 24 feet high, is 0.5 mile off Makahoa Point; 0.2 mile N of the islet is a rock that covers 4 feet and sometimes breaks.

Wooded **Kalanai Point,** 4 miles SE of Kahuku Point is on the N side of Laie Bay. **Mokuauia,** an island 0.2 mile long and 23 feet high, is 0.2 mile off the point; between the island and the point are depths of only 1 or 2 feet. A rock 0.2 mile seaward of the island is covered 10 feet.

Pulemoku, a rock 30 feet high, is 0.4 mile SE of Mokuauia. A 2-foot-high rock is close to the S side of Pulemoku.

Laie Bay has outer depths of 3 to 7 fathoms, and a narrow reef opening affords access to shelter and landing for local small craft. **Laie,** at the head of the bay, has a Mormon Temple, a large, flat-roofed building that is visible from seaward.

Laniloa a low, narrow peninsula with rocky beach is on the S side of Laie Bay. Off the outer end of Laniloa are two small rocky islets; **Kukuihoolua,** 30 feet high and **Mokualai,** 33 feet high.

Kaipapau Hill, about 700 feet high, is 2 miles S of Laniloa and a half mile inland; the hill has a pyramidal-shaped, grass-covered top.

Hauula is a beach settlement 2.5 miles S of Laniloa. **Punaluu** 4 miles S of Laniloa, is a beach settlement with a prominent apartment building near the beach.

Kahana Bay, 11 miles SE of Kahuku Point, has an entrance width of a mile between **Makalii Point** on the N and **Mahie Point** on the SE; inland extent is 0.6 mile. Local small craft make the narrow passage through the reef and find limited shelter behind it. A breakwater protects a launching ramp on the W side of the bay. The breakers on both sides of the bay are the only guides for entering.

Chart 19359.–Kualoa Point, 15 miles SE of Kahuku Point, is on the NW side of the entrance to Kaneohe Bay. **Mokolii Island,** 206 feet high, is a conspicuous conical islet 0.3 mile seaward of Kualoa Point.

Kaneohe Bay has an entrance width of 4.6 miles between Kualoa Point on the NW and Mokapu Peninsula on the SE; greatest inland extent is 3 miles. The bay has low sand and coral beaches along which are many of the old diked fishponds, some which are still in use. Islands, coral reefs, and sand shoals are numerous throughout the bay. Mokolii Island, **Kapapa Island,** 2 miles NW of Mokapu Peninsula and in the center of Kaneohe Bay, and **Kekepa Island,** mushroom-shaped and 0.5 mile NW of Mokapu Peninsula, are easy to identify from seaward and make for a good landfall during daylight. **Moku o Loe Island (Coconut Island),** in the SW part of the bay, is the largest of the islands.

The University of Hawaii operates a launch that ferries university personnel to and from the Hawaii Institute of Marine Biology on the island of Moku o Loe. The launch runs from the island to a nearby pier on the SW side of Kaneohe Bay.

Kaneohe Bay is a **Naval Defensive Sea Area** established by Executive Order No. 8681 of February 14, 1941. The order says in part:

"The territorial waters within Kaneohe Bay between extreme high-water mark and the sea and in and about the entrance channel within a line extending 3 miles NE from Kaoio Point, a line extending 4 miles NE from Kapaho Point, and a line joining the seaward extremities of the two above-described bearing lines, are hereby established and reserved as a naval defensive sea area for purposes of national defense, such area to be known as Kaneohe Bay Naval Defensive Sea Area; and the airspace over the said territorial waters is hereby set apart and reserved as a naval airspace reservation for purposes of national defense, such reservation to be known as Kaneohe Bay Naval Airspace Reservation.

"At no time shall any person, other than persons on public vessels of the United States, enter Kaneohe Bay Naval Defensive Sea Area, nor shall any vessel or other craft, other than public vessels of the United States, be navigated into said area unless authorized by the Secretary of the Navy.

"At no time shall any aircraft, other than public aircraft of the United States, be navigated into Kaneohe Bay Naval Airspace Reservation, unless authorized by the Secretary of the Navy."

Note.–Naval control over entry into Kaneohe Bay Naval Defensive Sea Area has been suspended, except for a 500-yard **prohibited area** around the perimeter of Mokapu Peninsula where only authorized vessels may enter. Naval control may, however, be reinstated without notice at any time.

Kaneohe Marine Corps Air Station is on Mokapu Peninsula. Mariners are advised that field operations are conducted throughout the year and divers, rafts, and aircraft may be operating in the bay. Caution should be taken when operating near the air station runway.

COLREGS Demarcation Lines.–The lines established for Kaneohe Bay are described in 80.1430, chapter 2.

Two channels lead through the reefs to the SE end of the bay. The deeper approach from the N end of the bay is through a dredged channel entered about 2 miles E of Kualoa Point. The channel is marked by lights, buoys, daybeacons, and a **227°** and a **349°30′** lighted range with the front range tower common to both. In May 1976, the controlling depth in the channel was 25 feet. Sampan Channel (Kaneohe Passage) to the SE, is entered about 0.85 mile NW of the N extremity of Mokapu Peninsula. This channel intersects the deeper channel about 0.9 mile W of Mokapu Peninsula, and is marked by a **217°15′** lighted range, daybeacons, and lighted and unlighted buoys. In May 1976, the controlling depth was 8 feet.

Crashboat Channel, about 0.4 mile W of Mokapu Peninsula, has been dredged by the Navy for search and rescue vessels. This channel is within the prohibited area and should not be used by pleasure craft as it may hamper aid to a needy vessel or downed pilot. The Navy monitors 2716 kHz at its search and rescue facility on the SW side of Mokapu Peninsula; telephone number (257-2941 or 257-3543).

Special anchorages are in the SE and W parts of Kaneohe Bay. (See 110.1 and 110.128d (a) and (b), chapter 2, for limits and regulations.)

Dangers.–Mariners are advised to exercise caution as the channels and other dredged areas in the bay have not been dragged or swept. Numerous coral heads are along the sides of the channels, and many of these are marked by privately maintained pipes extending 3 to 5 feet above the water.

The bay is by far the best locality for the operation of small craft on Oahu. Many permits are being obtained by property owners to dredge small-boat basins and channels through the reefs. Numerous docks, including the Kaneohe Yacht Club, are in the bay. In addition, many uncharted private floats and buoys, used to mark race courses, moorings, and fish and lobster pots are throughout the bay.

Storm warning signals are displayed. (See chart.)

A 015°-195° measured course, 3,038 feet long, is SE of Moku o Loe Island in Kaneohe Bay. The range markers are 30-by 40-inch white daymarks with orange borders set on coral reefs about 0.4 mile off the SE shore of the bay.

Kaneohe near the SE end of the bay is the principal community in the area. Radio towers are prominent at **Heeia,** a mile NW of Kaneohe.

Heeia Kea Small-Boat Harbor, just N of Kealohi Point about 0.9 mile N of Heeia, is open to the public. In March-April 1976, the controlling depth in the harbor was 6 feet. Gasoline, diesel fuel, and water, and a launching ramp are available.

Storm warning signals are displayed. (See chart.)

Chart 19357.–Mokapu Peninsula, 20 miles SE of Kahuku Point, has a greatest elevation of 683 feet. **Pyramid Rock,** on the NW point of the peninsula, is black and has a sharp summit. **Pyramid Rock Light** (21°27.9'N., 157°46.0'W.), 101 feet above the water, is shown from a white square concrete house with black diagonal stripes. **Puu Hawaiiloa** is a 337-foot hill near the center of the peninsula. A red and white skeleton tower and a nearby aerobeacon atop the hill are the most prominent navigation aids on the peninsula.

A weapons training range **danger zone** extends NNE from Mokapu Point. (See 204.224c, chapter 2, for limits and regulations.)

Ulupau Crater, part of an old crater rim, is a rocky headland at the NE end of Mokapu Peninsula. **Mokumanu Islands,** two islets with vertical sides 202 feet and 132 feet high, are 0.7 mile N of the headland. The passage between the islets and the peninsula has midchannel depths of 3½ to 5 fathoms, but is not recommended for strangers. An E current is reported in the vicinity of Mokumanu Islands.

The beach between Mokapu Peninsula and Makapuu Point, 10 miles to the SE, is mostly low and sandy, with black rocks showing in some places. Between the beach and the cliffs of the Koolau Range is a narrow strip of cultivated land. The cliffs are characteristic of Koolau Range from behind Kaneohe Bay to rugged Makapuu Head.

Mokolea Rock, 20 feet high, is a mile off the SE side of Mokapu Peninsula; the small, black rock has depths of 6 to 8 fathoms around it.

Kailua Bay, S of Mokapu Peninsula, is an open bight which affords no shelter from the trades. The N part of the bay is free of the usual fringing reefs, and there is a sand beach at the head of the bay.

Alala Point, on the S side of Kailua Bay, is a low bluff with a 25-foot white stone monument that resembles a lighthouse. A public launching ramp is on the W side of the point.

Mokulua Islands, 0.7 mile from shore and midway between Mokapu Peninsula and Makapuu Head, are steep, rocky, and grass covered. Elevations are 206 feet for the N islet and 182 feet for the S islet. On the shore side of the islets is an extensive reef; between the reef and the shore is a small-boat passage that leads to private landings.

Chart 19358,–Wailea Point, 5 miles NW of Makapuu Head, is the NW point of Waimanalo Bay. An inactive airfield occupies a large area S of the point.

Waimanalo Bay, between Wailea Point and Makapuu Head, affords all-weather shelter for small craft behind the barrier reefs that parallel much of the bay's shore. A 2-mile stretch off midbay has no fringing coral reef; in its S part, the reef gets closer to shore and disappears near Makapuu Head. Depths of 10 feet can be carried into the bay except during strong trades when the entrance is closed by breakers. **Waimanalo** is on the coastal highway that skirts the head of the bay.

Manana Island, 361 feet high, is a mile NNW of Makapuu Point Light. The island is part of an old crater and has a lighter shade of rock than any other in the vicinity. The sides are bluff except on the W where there is a short sloping point. The water is deep on the seaward side of Manana Island, and there are depths of 4 fathoms between the island and the mainland; the 4-fathom passage is not recommended for strangers.

Kaohikaipu Island, 80 feet high, is a flat, black mass of rock midway between Manana Island and Makapuu Head. A double rock, 10 feet high, is 200 yards NE of Kaohikaipu, and a small black rock, barely above water, is about the same distance SW of the island. There are depths of 4 fathoms between Manana and Kaohikaipu, but passage is not recommended for strangers because reefs make off from both islands. Depths are 4 to 6 fathoms in the bight between Kaohikaipu Island and Makapuu Head; passage is not recommended.

About 1.2 miles NW of Makapuu Point is a privately operated ocean research facility. An L-shaped pier, protected by a breakwater, extends 700 feet into the bay. In 1972, the basin and the channel leading to the facility had a reported controlling depth of 12 feet. The channel and the basin are privately marked by buoys, daybeacons and a **211°46'** lighted range. A **restricted area** of the Makai Undersea Test Range extends about 2.5 miles offshore. (See 207.807, chapter 2, for limits and regulations.)

Chart 19380.–Kauai Channel, NW of Oahu, is wide, deep, and clear. During the trades the current usually sets W across the channel and divides at Kauai, part following the N side of the island and the other part following the S side. Strong S or SW winds cause the current to set in the opposite direction to that produced by the trades.

Chart 19381.–Kauai Island, 63 miles NW across Kauai Channel from Oahu, has an area of 555 square statute miles and is fourth largest of the eight major islands. Kauai measures 29 nautical miles E-W by 23 miles N-S and slopes from centrally located **Kawaikini,** a 5,170-foot peak. **Lihue,** the seat of Kauai County, is 2 miles inland from the east-coast port of Nawiliwili.

The mountains on the W and N sides of Kauai descend in steep, jagged ridges; the gentle slopes on the E and S sides are cut by numerous gulches. The peaks are nearly always cloud covered, making them difficult to see from any great distance. Dome-shaped **Haupu,** 2,297 feet high, is prominent in the SE part of the island. The entire NW coast is backed by high bluffs; the rest of the coast is mostly low and rocky with some scattered sand beaches. A low coastal plain extends W from the town of Waimea. The few outlying dangers can be avoided by giving the coast a berth of 2 miles.

Harbors and ports.–Nawiliwili, on the E coast, and Port Allen, on the S coast, are the only commercial harbors on Kauai and are the only places that afford shelter in almost all weather.

Small craft planning to visit Kauai should carry two good holding anchors, because mooring space is scarce and there are few well-protected anchorages. Advance arrangements with the Kauai District Manager, Harbors Division of the Hawaii Department of Transportation, are advised.

Currents.–The oceanic currents in the vicinity of Kauai generally follow the winds. The available local information relative to currents is given in the discussions of the various localities.

Weather.–The trade winds divide on the E side of Kauai, one part follows the N coast and one part the S coast, and unite again some distance W of the island. On the W side, between Mana Point and Makaha Point, calm or light variable airs prevail. A moderate SW wind is sometimes felt at Waimea Bay, while a strong E wind is blowing about 2 miles offshore. Along the N and S shores the early morning trade wind is usually light until about 0900 and again decreases in strength about 1600. Occasionally kona winds, starting in the SE, displace the normal trades; this condition occurs more often during the winter.

The E and N, or windward, sides of the island are noted for their heavy rainfall, which reaches a maximum yearly average of more than 400 inches on 5,080-foot-high **Waialeale.** The lower slopes have much less rain, and along the S side the fall seldom exceeds 20 inches. The winter, from December to March, produces the strongest winds, which sometimes reach gale force and are accompanied by more rain than is usual at other times of the year.

(See page T-12 for **Lihue climatological table.**)

Supplies and repairs.–Food supplies are obtainable at the various towns on the island, particularly at Lihue, the county seat. Marine supplies are limited to small-craft requirements and occasionally must be ordered from Honolulu. Fuel and water are available at Nawiliwili and Port Allen; limited bunker C oil is available at Port Allen. The island has no repair facilities for medium or large vessels, but minor repairs can be made at Nawiliwili and Port Allen.

Communications.–Port Allen and Nawiliwili are ports for a few interisland barges and transpacific vessels. Interisland passenger traffic is by air. Telephone communication is available to the other islands and to the mainland. A good highway skirts the island except on the NW side.

Chart 19383.–Nawiliwili Bay, on the SE side of Kauai, has an entrance width of 0.8 mile between Carter and Ninini Points and an inland extent of about a mile. **Nawiliwili,** on the N side of the bay, is one of the two commercial deepwater ports on Kauai and is protected by a breakwater, marked at the end by a light, extending NE from Carter Point, and by a jetty in the inner harbor. SE winds produce some surge, but the harbor is otherwise secure.

Prominent features.–The shore consists of rocky bluffs, except at the mouth of Huleia Stream and in the vicinity of Nawiliwili. The jagged, mountainous coast extending SW from the bay is in marked contrast with the lowlands of Huleia Stream, on the SW side of the bay, and affords a means of fixing the entrance from well offshore. A water tank on the wharf and a large white bulk sugar warehouse on the hill overlooking the wharf are conspicuous.

A flashing amber warning light, privately maintained and shown about 4 feet above the roof on the SW corner of the shed (largest shed on the N piers) on Pier 2, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

Ninini Point, on the N side of the entrance, is low, flat, and rocky, and is backed by land planted in cane. A rocky ledge with a depth of 12 feet at the outer end extends about 100 yards S of the point. **Nawiliwili Harbor Light** (21°57.5'N., 159°20.3'W.), 118 feet above the water, is shown from an 86-foot buff-colored cylindrical concrete tower on the point. The loom of the light is frequently seen by vessels 40 miles away.

Kukii Point, 0.7 mile W of Ninini Point and the N entrance point of the inner harbor, is a high bluff with a low, rocky shelf at the base. There is a light on the point.

Carter Point, on the S side of the entrance to Nawiliwili Bay, is rocky and rises rapidly to **Kalanipuu;** the hill is marked by an aviation obstruction light 754 feet high. The mountain spur that extends inland rises to Haupu, the most prominent feature of SE Kauai.

Kawai Point, 0.5 mile S of Carter Point, is a bold rocky headland, 525 feet high, very irregular and jagged in appearance.

COLREGS Demarcation Lines.–The lines established for Nawiliwili Harbor are described in 80.1450, chapter 2.

Channels.–A Federal project provides for an entrance channel 40 feet deep to a harbor basin 35 feet deep; the channel is marked by lighted and unlighted buoys. In September 1978, the midchannel controlling depth in the entrance channel was 37 feet, thence depths of 30 to 35 feet were available in the basin, except for shoaling to lesser depths along the edges.

Anchorage with some protection from the trades can be found between Ninini and Kukii Points, outside the breakwater, although it is reported that the holding ground is poor. Small boats can find excellent anchorage in **Huleia Stream,** except when the sandbar at the mouth closes the entrance. The stream which empties into the SW end of the bay is navigable for small craft only at high water to the first footbridge, about 2 miles above the entrance, where a dam obstructs further passage.

Small boats sometimes anchor in the bight between Kukii Point and the seawall N of the jetty. The bottom is sand and coral and there is a sand beach at the head of the bight.

A **special anchorage** is N of the Nawiliwili Small-Boat Harbor. (See 110.1 and 110.128c, chapter 2, for limits and regulations.)

Caution when entering.–The reverse turn, first around the breakwater and then around the seawall, which must be made when approaching the wharf, is difficult for large vessels in all but calm weather, and the assistance of a tug is usually needed. Additionally, caution must be exercised in the area of the breakwater because many boulders have been dislodged. Vessels are sometimes required to drop anchor before warping alongside. The harbor has little surge.

Tide.–The mean range of tide is 1.1 feet and the diurnal range of tide is 1.8 feet at Nawiliwili.

Pilotage.–is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for coastwise vessels who have on board a pilot licensed by the Federal government.

The pilot boat, NININI, is yellow and 22 feet long with the word PILOT in black letters on the hull. The boat displays the International Code flag "H". Pilots are available during daylight only. The pilot boarding station is 1 mile ESE of Nawiliwili Harbor Light. The pilots monitor and use as a working frequency VHF-FM channel 12 (156.60 MHz). Mariners are requested to give at least 24 hour advance notice of arrival and gross tonnage, length, and draft of vessel; telephone (808-537-4169). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots. Seas are normally rough at the boarding station.

Towage.–A 65-foot, 1,100 hp tug is based at Nawiliwili and services both Nawiliwili and Port Allen. Assistance of the tug is usually necessary when approaching or leaving the wharf.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A private hospital is at Lihue.

Nawiliwili is a **customs port of entry.**

Coast Guard.–A Coast Guard station is on the N side of Nawiliwili Bay.

Harbor regulations are established by the Harbors Division of the Hawaii Department of Transportation and enforced by the harbormaster.

The **speed limit** in the harbor is 5 m.p.h.

Wharves.–The State Wharf, in the N part of the harbor, provides 1,140 feet of berthing space with depths of 35 feet reported alongside, and a deck height of 8 feet. Pier 1, the E 438-foot section of the wharf, is used principally for the receipt and shipment of general and containerized cargo by barge in the interisland trade, and for the receipt of lumber, bulk cement, and petroleum products. Pier 2, the W 702-foot section of the wharf, is used for the receipt and shipment of general and containerized cargo by deep-draft vessels in the foreign and domestic trade; the receipt of liquefied petroleum gas and petroleum products; and for the shipment of bulk raw sugar and molasses. Two transit sheds and an annex shed with a total of 62,000 square feet of storage space are available for cargo in transit.

General cargo at the wharf is usually handled to and from vessels by ships' tackle and to and from barges by forklift trucks. Crawler and truck cranes can be obtained locally; no floating cranes or derricks for making heavy lifts are available at the port.

Supplies.–Gasoline, kerosene, fuel oil, and diesel fuel are available by tank truck, and water is piped to the pier. Some provisions and supplies are available at Lihue. Marine supplies are limited to items for small craft.

Repairs.–There are no facilities available at Nawiliwili for making major repairs or for drydocking large, deep-draft vessels. Several machine, electrical, and welding concerns off the waterfront in Nawiliwili and in Honolulu are available for making above-waterline repairs to vessels berthed at the port.

Nawiliwili Small-Boat Harbor is on the SW side of Nawiliwili Harbor. The entrance to the small-boat harbor is marked by a lighted buoy, and the jetties that protect the harbor are each marked by a light at their seaward ends. A launching ramp is on the N side of the harbor. In July 1979, the controlling depths were 12 feet in the entrance channel, thence 5½ to 12 feet were available in the small-boat harbor except for shoaling to lesser depths along the edges.

Chart 19381.–**Kawelikoa Point,** 4 miles SW of Nawiliwili Bay, is a dark, rocky headland 691 feet high. The point is at the seaward end of a ridge which extends N to a 2,297-foot-high peak of Haupu.

From about 1.5 miles SW of Kawelikoa Point to Hanapepe Bay, the coast is a series of low bluffs and beaches; the back country is mostly under cultivation, and the cane fields extend well up the slopes in some places.

Makahuena Point, 7 miles SW of Nawiliwili Bay, is the S extremity of Kauai. The low, flat point has a rocky shore with bluffs 20 to 50 feet in height. The land near the point is sandy and rolling, and there are short stretches of sand beach both NE and W of the point. A hotel is prominent on the W side of the point. **Makahuena Point Light** (21°52.3'N., 159°26.8'W.), 80 feet above the water, is shown from a 20-foot white pyramidal concrete tower on the point. The bottom slopes gradually to a depth of 7 fathoms about 0.5 mile off the point.

Several reefs extend about 300 yards offshore between the point and Koloa Landing.

There is a conspicuous mill stack at **Koloa,** 2 miles inland from Makahuena Point. The stack is visible all along this coast except for the short distance where it is hidden by **Paa Cones,** which are on a long, low ridge that extends inland from the point.

Koloa Landing, 1.5 miles W of Makahuena Point, has a landing slip for small, flat-bottom boats and outrigger canoes. The landing slip is treacherous, and only persons familiar with the landing should attempt to land a small boat. Anchorage is available in depths of 12 fathoms, rocky bottom, about 400 yards S of the landing. A road leads inland to Koloa.

Kuhio Park is 0.5 mile W of Koloa Landing and on the shore road. There are several beach houses between the landing and the park.

Kukuiula Bay, 3 miles W of Makahuena Point, has an entrance width of 150 yards and an inland extent of 300 yards; considerable protection is afforded small craft except in S winds. A wreck (21°52.9'N., 159°29.6'W.), covered 25 feet, is about 0.3 mile S of the breakwater. A breakwater, marked by a private light, is on a reef that extends from the SE point of the bay; the concrete wharf on the inner side of the breakwater is lighted at night and is used for loading and unloading small craft. Depths of 10 feet are reported alongside the wharf and in the bay. There is a walled-in launching ramp and catwalk for small craft at the SE corner of the bay. **Kukuiula** is a settlement at the head of the bay. A quarter mile W of Kukuiula is the **Spouting Horn,** a seawater spout which is active even in smooth weather.

Lawai Bay, 3.5 miles W of Makahuena Point, has an entrance width of 300 yards and an inland extent of 0.2 mile; fair protection is afforded small craft except in S winds. The side shores of the bay are low and rocky, but there is a wide sand beach at the head. A grass-topped rock, 70 feet high, stands at the upper edge of the sand on the W side of the bay.

Makaokahai Point, 4.6 miles W of Makahuena Point, is easily recognized because of the several hills extending N from it. One particularly prominent hill, 0.5 mile inland, is 436 feet high and well rounded, has canefields on the lower slopes, and is evenly capped with trees. The first low hills on the point are the walls of a water-filled crater.

Ioleau, 1.1 miles N of Makaokahai Point, is a flat-topped 625-foot hill. A Vortac station on the hill is a good landmark.

Kalanipuao Rock, with 2 feet of water over it, is about 0.3 mile SE of Makaokahai Point and is marked by a buoy. Vessels should not attempt to pass N of the buoy.

Koheo Point, 1.4 miles W of Makaokahai Point, is level and covered with vegetation. A radio tower is on the W side of the point. A mill stack, 0.7 mile NW of the point at McBryde, is very prominent and can be seen all along the S coast.

Chart 19382.–Wahiawa Bay, 2.8 miles W of Makaokahai Point and 1 mile E of Port Allen, is 170 yards wide at the entrance and indents the coast about 0.2 mile. Excellent protection is afforded small craft in all but S winds. Boats anchor in depths of 5 to 10 feet, sandy bottom. The sides of the bay are rocky. The seas usually break over the shoal 100 yards off **Weli Point** on the SE side of the bay.

Hanapepe Bay, midway along the S coast of Kauai, is the approach to **Port Allen.** The bay is about 0.6 mile wide and indents the coast about 0.4 mile. A breakwater protects the pier at Port Allen on the E side of the bay. The shores are low, rocky bluffs except at the head of the bay, where there is a sandy beach.

Local magnetic disturbance.–Differences of as much as 2¼° from normal variation have been observed at Hanapepe Bay.

Prominent features.–Hanapepe Bay Breakwater Light (21°54.0'N., 159° 35.6'W.), 32 feet above the water, is shown from a white pyramidal concrete tower on the end of the breakwater. The E side of the bay has several oil tanks and warehouses. A light is on low, flat, and rocky **Puolo Point** on the W side of the bay. An airport used by small planes is back of the point. A mill stack and buildings are 2 miles E of Port Allen.

COLREGS Demarcation Lines.–The lines established for Port Allen Harbor are described in 80.1440, chapter 2.

Channels.–A Federal project provides for 35-foot depths in the entrance channel and basin. In May 1973, the midchannel controlling depths was 35 feet in the entrance channel, and depths of 30 to 35 feet were available in the bay with lesser depths along the edges of the bay.

Dangers.–A reef extends about 200 yards from the shore E of the inner end of the breakwater. In heavy weather breakers extend 350 yards offshore on the NW side of the bay and 50 to 150 yards off the SE side of Puolo Point.

Anchorage.–The usual anchorage off Port Allen is in depths of 9 fathoms, coral and sand bottom, about 0.5 mile SE of the breakwater light. This anchorage is just within the red sector of the light on Puolo Point. The harbor affords shelter for all craft in almost all weather, but may become congested. A small-craft harbor, protected by breakwaters, is about 100 yards N of the pier.

Tides and currents.–The diurnal range of tide is 1.7 feet at Port Allen. The prevailing current off Puolo Point is W.

Pilotage.–is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade; it is optional for coastwise vessels who have on board a pilot licensed by the Federal government. The pilot boat, NININI, is yellow and 22 feet long with the word PILOT in black letters on the hull. The boat displays the International Code flag "H". The pilot boarding station is 0.75 mile S of Hanapepe Bay Breakwater Light. The pilots monitor and use as a working frequency *VHF-FM* channel 12 (156.60 MHz). Mariners are requested to give at least 24 hours advance notice of arrival and gross tonnage, length, and draft of vessel; telephone (808-537-4169). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots.

Towage.–A 65-foot, 1,100 hp tug based at Nawiliwili services vessels entering or leaving Port Allen.

Quarantine, customs, immigration, and agricultural quarantine.–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A private hospital is at Waimea.

Port Allen is a **customs port of entry.**

Harbor regulations are established by the Hawaii Department of Transportation, Harbors Division and enforced by the **harbormaster.**

The **speed limit** in the harbor is 5 m.p.h.

Wharves.–The State pier in the E part of the harbor provides 600 feet of berthing space along both the N and S sides, and 124 feet along the W face. Depths of 35 feet are reported along the sides and at the face; deck height, 11 feet. A transit shed with 24,000 square feet of covered storage space, and open storage are available. Pipelines are on the wharf, and bulk handling and storage facilities for molasses, liquid fertilizer, and petroleum products are in the port. General cargo, and barge and tanker traffic are handled at the pier.

Vessels are advised to drop an anchor when approaching the pier. This assists in maneuvering to a berth as well as getting away in an emergency. During and after strong winds some surge is experienced at the pier. This condition may require small and medium craft to cast off and sometimes interferes with the cargo handling of large vessels.

Just N of the State pier is the State small-craft harbor, a sheltered basin protected by breakwaters. Craft drawing up to 6 feet can be accommodated in the basin. A launching ramp, loading pier, fuel pier, and a 1-ton hoist are on the E side of the basin.

Supplies.–Gasoline, fuel oil, and diesel fuel are available by tank truck, and water is piped to the wharf. Provisions are available in the principal towns on the island. Marine supplies are limited to small-craft items.

Repairs.–Facilities for minor repairs to vessels are available.

Communications.–Port Allen has highway and telephone communication with other parts of the island and radiotelephone and air communication with the other islands of the group. The town is a port of call for interisland barge and transpacific vessels.

Chart 19386.–Kaumakani is 2 miles NW of Puolo Point and a half mile inland. A mill stack is prominent.

Robinson Landing, *1 mile NW of Kaumakani,* is a small-boat harbor with a dredged entrance that accommodates drafts of 2 to 4 feet. A stone wall has been built around the harbor edges, and a marine railway is available for handling small craft. This is a private landing and cannot be used without the owner's permission.

Hoanuanu Bay, 2 miles NW of Kaumakani, has depths of 2 to 3 fathoms and affords good protection from trade winds for small craft. The E side of the bay is rocky; the NW side is a sand beach. A breaking area extends 0.5 mile off **Poo Point,** which is on the NW side of Hoanuanu Bay. A buoy is moored in 44 feet 0.9 mile off the point.

Waimea Bay, an open bight 3 miles NW of Kaumakani, is the approach to **Waimea,** which is the place where Captain James Cook, R.N., made his first (January 1778) landing in the islands.

A **naval anchorage** is off Waimea Bay. (See 110.1 and 110.237, chapter 2, for limits and regulations.) Good anchorage, for other vessels, can be found in and off Waimea Bay during ordinary weather in depths of 3 to 20 fathoms, sand bottom. Small boats usually shift anchorage to Hoanuanu Bay for better protection when the trades are strong. Depths of 5 to 18 feet extend 0.3 mile from the shore of Waimea Bay. The Waimea pier, 0.3 mile NW of the Waimea River, is in ruins and is not usable. The town has a hospital.

Waimea River, which empties into Waimea Bay along the E side of Waimea, is navigable only for pulling boats because of the bar across the mouth; the river descends from the mountains through the deepest gorge on this part of Kauai. The ruins of a Russian fort are on the E side of the river's mouth; the fort was built in 1815 and abandoned in 1817.

Between Waimea River and **Oomano Point,** 2.3 miles to the W, a reef extends 0.4 mile from shore and breaks in heavy weather. **Kikiaola Boat Harbor,** 1.6 miles W of the river, is entered over the reef and is protected by breakwaters marked by privately maintained lights. The harbor has a launching ramp and loading piers; the entrance is marked by a privately maintained lighted range. The controlling depth is about 6 feet over the reef and 2 to 5 feet in the basin. Caution should be exercised when entering or leaving the harbor due to the combined effects of the breakers and the 90° turn in the basin.

Chart 19381.–A low plain, about 2 miles wide, extends W from Waimea River around Kokole Point and N to Barking Sands beyond Nohili Point. Sugarcane is cultivated on most of this flat area. The shore side of the plain has a growth of algaroba trees, behind which are occasional sand dunes.

Kekaha is a plantation settlement on the NW side of Oomano Point and 2.5 miles from Waimea River. A mill stack is prominent.

Kokole Point, 5 miles WNW of Waimea River, is low, rounding, and wooded. **Kokole Light** (21°58.9' N., 159°45.5' W.), 58 feet above the water, is shown from a three-legged tower with a red and white diamond-shaped daymark on the point. The transmitting antenna of Radio Station **WWVH** (National Bureau of Standards) is about 0.7 mile NW of Kokole Light.

Mana Point, about 3.5 miles N of Kokole Point, is the W extremity of the island. Along the water's edge is a strip of sand that extends 2 miles on either side of the point, but the sea breaks on a lava ledge at the edge of the sand, making the beaching of boats dangerous except when the sea is smooth.

Current observations taken during a 24-hour period 0.5 mile off Mana Point show a tidal current of 0.8 knot velocity at strength setting S and N along the coast. The S maximum occurs about 3 hours after low water at Honolulu, and the N maximum 3 hours after high water. Similar observations taken near the coast about 3.8 miles NNE of Nohili Point show a tidal current with velocities generally less than 0.5 knot.

Discolored water, caused by the drainage canals and the undertow from the beach, is often noted as far as 2 miles off Mana and Kokole Points. The village of **Mana,** 1 mile inland from Mana Point, is marked by several large bushy trees and tall coconut palm trees. An aviation control tower at Bonham auxiliary navy landing field 1 mile SW of Mana is prominent.

A **danger zone** is between Mana Point and Nohili Point. (See 204.225a, chapter 2, for limits and regulations.)

Nohili Point, about 6 miles N of Kokole Point, is marked by **Nohili Dune,** 100 feet high, and the highest and southernmost of a chain of sand dunes extending along the coast for 2.5 miles to the NE. The dunes are known as **Barking Sands** and mark the N limits of the cane fields. A road continues to Polihale. A light is on the point.

A narrow sand shoal, with depths of 7 to 10 fathoms, extends from Nohili Point to **Alapii Point,** 7.5 miles to the NE. The shoal, which appears to be a succession of E-W sand ridges, is 1 to 2 miles from shore. A depth of 3 fathoms is 0.5 mile W of Alapii Point; from there to Kailiu Point, 7 miles farther to the NE, the 15-fathom curve is at an average distance of 1 mile from shore. A private aerolight is about 2.5 miles SW of Alapii Point, and a conspicuous radar dome antenna is on top of a high ridge about 3 miles ESE of Alapii Point.

From Barking Sands NE to Kailiu Point, the coast is rocky and precipitous. The section between Alapii and Kailiu Points consists of a series of cliffs known as **Na Pali (Napali).** These cliffs are 2,000 feet high in some places, and are cut up by numerous streams which form small waterfalls. The S part of this section is practically bare, but the N part is wooded.

Kalalau Valley, 2.5 miles NE of Alapii Point, is the broadest and deepest valley along the NW coast and is easily distinguished from seaward.

Kailiu Point, on the N coast of Kauai, is the seaward end of a jagged ridge that ends abruptly in a sharp peak 1,200 feet high. There is a narrow strip of lowland at the point.

Chart 19385.–Haena Point, 1.2 miles E of Kailiu Point, is low and rounding. A reef, which bares at low water, extends 0.3 mile NW from the point. The **Haena Caves,** which cannot be seen from seaward, are 0.2 mile inland under the bold face of the mountains; the caves are near the W end of the highway that skirts the N shore of Kauai.

Wainiha Bay, 1.3 miles E of Haena Point, has an entrance width of 0.5 miles between the extensive **Kepuhi Point** reef on the W and **Kolokolo Point** on the E; inland extent is 0.4 mile. The bay is an open bight that affords little protection except in kona weather. **Wainiha River** empties into the head of the bay from the most W of the deep valleys along the N coast of Kauai.

Lumahai River, which is unnavigable, empties into the sea on the E side of Kolokolo Point; E of the river mouth is a sandy beach with a few rocky patches. The river valley is the W limit of the many rice fields on the N side of Kauai.

Makahoa Point, 2 miles ESE of Haena Point, is black and rocky. A half mile inland is Puu Ka Manu, a 714-foot hill.

Hanalei Bay has an entrance width of a mile between Makahoa Point on the W and the extensive Puu Poa Point reef on the NE; inland extent is nearly a mile. Breaking coral reefs finge the shores on both sides of the entrance. Seas break across the entire entrance during N or NW gales, but good protection is afforded from the trades. Midbay anchorage is in depths of 6 fathoms, sandy bottom.

Along the sandy beach at the head of Hanalei Bay are clumps of ironwood and coconut trees and the houses of **Hanalei.** The highway is close to the shore. Three miles inland the mountains attain heights of more than 4,000 feet.

Hanalei River, which empties into the E side of the bay, is navigable for shallow-draft boats for a distance of 2 or 3 miles. A privately dredged channel, marked by private daybeacons, passes close to the reef on the NE side of the bay and leads to the river mouth. At high water, a depth of 4½ feet can be carried over the bar at the mouth and about 4 feet to the bridge 1.8 miles above the mouth. A launching ramp is on the S side of the river, 0.1 mile above the mouth. A clump of ironwood trees is prominent on the N side of the river's mouth.

Overhead power and telephone cables with a clearance of 27 feet cross Hanalei River at its mouth.

A wharf, with a depth of about 4 feet at the outer end, is on the E side of the bay and 200 yards S of the Hanalei River. The wharf is unsafe. A prominent large white luxury hotel and cottages are on the bluff on the N side of the river near the entrance.

Waioli Stream and **Waipa Stream.** which empty into the head of Hanalei Bay, are not navigable. Rice and taro are grown extensively along these streams and along Hanalei River.

Puu Poa Point, on the E side of Hanalei Bay, is a bluff about 50 feet high, back of which a green ridge entends inland.

From offshore the N side of Kauai presents a very irregular and jagged skyline, with ridges extending in all directions. In the NW part of the island these ridges often end abruptly at the sea. The mountains are heavily wooded. The coast between Hanalei and Kalihiwai Bays is a series of more or less wooded bluffs cut up by gulches back of which a rolling plain extends to the mountains. Between the shore and the highway, 1 mile inland, are pineapple and sugarcane fields.

Kalihiwai Bay, 4.5 miles E of Hanalei Bay, is about 0.5 mile in diameter. **Kapukaamoi Point,** a red precipitous bluff about 150 feet high, is on the E side of the entrance. Several houses are scattered along the sand beach at the head of the bay, which is backed by a wooded gulch. Indifferent anchorage, with poor holding ground, can be found in depths of 5 fathoms in the center of the bay, but a heavy swell sets in during N winds. A rock awash is 150 yards N of Kapukaamoi Point. A reef, 0.2 mile wide and bare at low water, fringes the shore for 2.5 miles W from Kalihiwai Bay, and vessels should stay at least 0.8 mile offshore. A shore road, with beach houses along it, extends W from the bay for 1.5 miles.

Kilauea Point, the N extremity of Kauai Island, is a grass-covered bluff about 165 feet high. **Kilauea Point Light** (22°14.1′N., 159°24.3′W.), 174 feet above the water, is shown from a 10-foot white concrete pole. **Mokuaeae Island,** 200 yards off Kilauea Point, is a black, flat, grass-topped rock about 200 yards in diameter and 92 feet high. The island is the most prominent feature in the vicinity to coasting vessels.

Kilauea, 1.3 miles inland from Kilauea Point, is the site of a sugarmill, but is not easily seen when close to the shore. The sugar of the district is trucked to Nawiliwili for shipment.

Between Kilauea Point and Mokolea Point the coast is bluff, rising gradually from each point to an elevation of about 570 feet midway between them.

Makapili Rock, 0.8 mile SE of Kilauea Point, is 156 feet high, black, and prominent. The rock is on the outer end of a narrow neck of land that juts out 200 yards from the general coastline.

Mokolea Point, 1.2 miles SE of Kilauea Point, is narrow and 140 feet high, and projects out 0.3 mile from the general coastline. The point is on the NW side of Kilauea Bay and has two old buildings near its outer end. A rock quarry is on the E side of the point.

Kilauea Bay has an entrance width of 0.5 mile and an inland extent of 0.5 mile. The bay is open to the trades, but offers some protection in W weather. A narrow coral reef fringes the shore, and **Kilauea Stream** empties into the head of the bay. Anchorage can be found in depths of 6 fathoms, rocky bottom, near the center of the bay.

Low **Kepuhi Point** is 2 miles E of Mokolea Point. The low coast between the two points is fringed with a narrow coral reef.

Chart 19381.–Moloaa Bay (22° 12′ N., 159° 20′ W.), 4.5 miles SE of Kilauea Point, has an entrance width of 0.3 mile and extends the same distance inland to the mouth of a gulch. Little protection is afforded from the heavy swell that sets into the bay during the trades, but anchorage is possible during S winds in depths of 3 to 6 fathoms in midbay. There are a few houses along the sand beach at the head of the bay, and rice is grown in the gulch. The interior between Moloaa and Anahola Bays is used for pineapple cultivation and for grazing.

Papaa Bay, 6 miles SE of Kilauea Point, is a small bight that is wide open to the trades. The central part of the bay is foul, and there is a rock awash 300 yards from shore. A coral reef fringes the S shore.

Anahola Bay, 7.5 miles SE of Kilauea Point, is a small bight exposed to the trades. **Kahala Point,** a low bluff with a grove of ironwood trees near the outer end is on the SE side of the bay. **Kahala Point Light** (22°09.0′N., 159°17.9′W.), 42 feet above the water, is shown from a 20-foot steel pole with a diamond-shaped red and white daymark on the point. A water tank 1 mile W of the light is prominent. Discolored water frequently extends for a considerable distance off **Kuaehu Point** on the NW side of the bay. A reef extends about 0.3 mile from Kuaehu Point. Because of the numerous reefs, strangers should not attempt to enter the bay. In moderately smooth weather small vessels can find anchorage well inside the bay in depths of 4 to 6 fathoms, mud bottom.

Puu Konanae, 1.3 miles inland from Anahola Bay, is a tall, dark spire, with green slopes, that stands out more prominently than any other land feature on this part of the island.

Between Kahala Point and Kealia are low coastal bluffs and a rocky shore with some patches of sand.

Kealia, 3 miles S of Kahala Point, is a plantation village. A short breakwater, extending SE from the shore, affords some protection from N weather for shallow-draft boats. The breakwater is not kept in repair, and portions have been carried away by the sea. Vessels should not approach the village without local knowledge. About 0.7 mile S of Kealia, a flat building on a low hill is prominent from offshore.

Kapaa, 4.5 miles S of Kahala Point, is scattered along the beach. A reef, which is 0.3 mile wide in some places, extends alongshore from N of Kapaa to Hanamaulu Bay. An opening in the reef at Kapaa is usually marked by breakers on either side. Small craft find anchorage in depths of about 2 fathoms behind the reef and about 150 yards off the N side of the village.

Wailua is a settlement at the mouth of **Wailua River,** which empties into small **Lehuawehe Bay** 6.5 miles S of Kahala Point. The river, which is spanned by a bridge at its mouth, is navigable for small boats for several miles, once a shifting bar at the mouth is passed. Only very shallow draft vessels can cross the bar even at high tide, and only during calm weather. A public marina is 0.3 mile above the mouth. Vessels may find unprotected anchorage off Wailua in depths of 10 to 15 fathoms, rocky bottom, but like the whole NE coast of the island, anchorage is not safe when the trade winds are blowing. **Waipouli** is a village 1 mile NE along the highway from Wailua.

Nonou, 1.3 miles NW of Wailua and 1,241 feet high, is the northernmost and highest of the low mountains near the coast.

Kalepa Ridge is 1 mile inland and parallels the coast from Wailua to Hanamaulu Bay. The S end of the ridge, which is about 700 feet high, is marked by several buildings high on the seaward face of the bluff. The buildings can be seen for many miles offshore and are a good leading mark for Hanamaulu Bay.

Chart 19384.–Hanamaulu Bay, 10 miles S of Kahala Point and 2.6 miles N of Nawiliwili, is about 0.3 mile wide and indents the coast about 0.5 mile. **Ahukini Landing** is on the point on the S side of the entrance. Only the outer third of the bay has deep water; the sand and coral bottom slopes gradually from the 18-foot curve to the beach at the head of the bay. The shores of the bay are low, rocky bluffs, about 40 feet high, except for the white sand beach at the head. A fringe of trees on the bluffs forms a windbreak for the extensive cane fields on either side of the bay. **Hanamaulu Stream,** which empties into the head of the bay, is not navigable.

The 20-foot concrete tower of an abandoned lighthouse is on the outer end of the 300-foot stone breakwater that projects from the S point of Hanamaulu Bay entrance; the pilings and ruins of a small wooden pier are at the inner end of the breakwater. The bay is no longer used by large vessels. Only the concrete piling remains of the former wharf at Ahukini Landing, and most of the port installations are in ruins. A heavy outside swell causes a heavy surge in the harbor.

Chart 19381.–From Hanamaulu Bay to Nawiliwili the coast is a series of low bluffs with occasional stretches of sand beach; there are no offlying dangers. Sugarcane is grown extensively on the land back of the beach. An aerolight at Lihue Airport is 0.7 mile S of Hanamaulu Bay.

Chart 19380.–Kaulakahi Channel, between Kauai and Niihau, is about 15 miles wide and clear of obstructions. Off Mana Point the trade wind following the S coast of Kauai meets the air current that has followed around the N side. The trades blow directly across the lowlands of Niihau, but part is deflected S and around the SE point of the island.

Currents.–Little is known of the current in Kaulakahi Channel, but presumably it is variable depending mainly upon the velocity and direction of the wind. There appears to be a general NW flow along the SW coast of Kauai. It is reported that a current sometimes sets S along the E coast of Niihau at the same time that the current is setting NW along the Kauai coast. There are noticeable tidal currents near the W extremity of Kauai.

Niihau Island, 15 miles W across Kaulakahi Channel from Kauai, is seventh in size and westernmost of the eight major islands. Niihau has an area of 72 square statute miles, a NE-SW length of 16 nautical miles, and an average width of 3.5 miles. Near the middle of the island is a high tableland with occasional rises or cones, the highest of which is 1,281-foot **Paniau.** The N and E ends of the tableland are precipitous and vary in height from 600 to 1,000 feet; the S and W slopes are gradual. A road follows the W coast of Niihau for most of its length. The island has no streams.

The population of Niihau was 237 in 1970. One family owns the entire island and operates it as a cattle ranch. There are no scheduled communications with the island.

Lehua Island, about 0.6 mile off the N end of Niihau, is a small rocky, crescent-shaped island, with the crescent open to the N. The E and W points are low, rising gradually to an elevation of about 700 feet near the center of the island. On the W point is a natural arch. **Lehua Rock Light** (22°01.3' N., 160°06.1' W.), 709 feet above the water, is shown from a white skeleton tower on the summit of Lehua Island.

Lehua Channel, between Niihau and Lehua, is restricted on its S side by rocks that show above water and extend about halfway across it. A depth of 9 fathoms can be carried through the channel by staying within about 350 yards of the Lehua shore. In heavy NW weather the swell almost breaks in the passage, and, as little is to be gained by using the channel, vessels should pass N of Lehua Island. The current through the channel varies with the tide and sets in both directions with a velocity of about 1.5 knots.

To the E of Lehua Channel vessels should give the N coast of Niihau a berth of 0.5 mile; to the W the clearance should be about 1 mile.

Puukole Point, on the N end of Niihau, is low, as is **Kikepa Point,** 1 mile to the E. Between these points and the high bluff on the N side of the tableland, the land is low and grass covered, with a few low hills. From a distance this lowland is not visible and Lehua Island appears to be about 3.5 miles from Niihau.

Kaunuopou Point, 1.8 miles SE of Kikepa Point, is the easternmost point of Niihau. **Kaunuopou Rocks,** over which the sea breaks, are 300 yards off the point. Another rock, about 0.4 mile off the S side of the point, usually breaks and should be given a good berth by vessels approaching Kii Landing.

Kii Landing, a small bight about 0.7 mile W of Kaunuopou Point, is only slightly protected from the trade winds. The landing is usable in ordinary weather, but not in S weather. The landing is built on beach boulders and has depths of only 2 or 3 feet alongside. Anchorage can be had in depths of about 8 fathoms, coral bottom, about 0.6 mile off the landing.

About 1.3 miles S of Kii Landing a reef, with about 1 fathom of water over it and usually breaking, extends 0.5 mile offshore. The 10-fathom curve is about 1 mile offshore. From the vicinity of the reef to Pueo Point the coastline consists of cliffs reaching a height of 1,000 feet.

Pueo Point, 5 miles S of Kaunuopou Point, is a prominent brown, precipitous bluff about 800 feet high. SW from the point for a distance of about 4.5 miles the coastline consists of bluffs that gradually diminish in height toward the lowlands of the S half of the island. The bluffs are broken by small bights, most of which have short sand or pebble beaches where boats could land during smooth weather. Beyond the bluffs to Kawaihoa Point, a distance of about 6 miles, the coast consists of a series of low bluffs about 15 feet high, with stretches of sand beach, a few sand dunes, and scattered trees. Between Pueo Point and Kawailhoa Point are no known outlying dangers; the few isolated rocks are very close to the shore.

The lowland of the S part of the island is broken by two hills, one on Kawaihoa Point and the other, **Kawaewae**, a gently rounded hill 315 feet high, which is 4 miles N of the cape and 1.3 miles inland from the W coast.

Kawaihoa Point, the southernmost point of Niihau, is formed by a hill 548 feet high, the seaward face of which is steep. From a distance the hill has the appearance of an island and can easily be mistaken for Kaula Island. Deep water is close to the point. About 2 miles S of the point there is a prevailing W current which reaches a velocity of about 1.5 knots.

Beyond Kawaihoa Point the coast gradually curves NW and N and is low and rocky with occasional short sand beaches. At **Leahi Point**, 1.7 miles W of Kawaihoa Point, the 10-fathom curve is 0.6 mile offshore. A road skirts the W shore.

The coast between **Kamalino**, a former village 4 miles NW of Kawaihoa Point, and Puukole Point is practically one low, continuous beach, with an occasional group of rocks. Near the beach are numerous sand dunes covered with sparse vegetation. In the vicinity of Kamalino, weak currents have been reported setting N and S along the coast.

Nonopapa Landing, 5.5 miles NW of Kawaihoa Point, is the principal landing on the island. Local vessels call occasionally for the island's cattle. The landing is used only from May to September, as there is often a heavy N swell during the winter. The landing is marked by a shed and derrick on a short concrete retaining wall at the N end of a long sand beach. **Kaeo**, a cone 1,018 feet high and near the center of the tableland, shows on the skyline from the anchorage.

Anchorage is available in depths of 8 fathoms, coral and sand bottom, about 660 yards off the derrick, with the landing shed and Kaeo in range and bearing 070°. Kawaewae is 1.5 miles 135° from the anchorage. The landing is somewhat protected by a small reef extending about 75 yards SW from the end of the retaining wall. Small boats approaching the landing head S of it until the reef is rounded. **Puuwai**, the principal village of the island, is about 2.5 miles NE of the landing.

Kuakamoku Rock, 1.6 miles N of Nonopapa Landing, is a large, single rock about 4 feet above water and near the center of a reef some 200 yards in diameter and 500 yards offshore. The reef should be given a berth of 0.5 mile, and only small craft should attempt the passage between the reef and the shore. Other reefs extend about 0.5 mile offshore 0.5 mile S, and 3 miles NE of Kuakamoku Rock.

Kaununui Point, 4.5 miles NE of Kuakamoku Rock, is marked by a group of rocks a few feet high and close to the shore. A coral reef with depths of 6¼ fathoms over it is 1.5 miles off the point. It is reported that the reef breaks in heavy weather. The passage inside the reef is not recommended except for small boats.

Keawanui Bay, is no more than a slight curve in the shoreline that extends NE from Kaununui Point for 3 miles. The bay has a sand and coral bottom and a sandy shore. A rock with 2 feet of water over it is in the S part of the bay, 0.8 mile N of Kaununui Point, and 0.5 mile offshore.

From the N side of the bay to Puukole Point the coast is foul for a distance of about a mile offshore. Vessels should give this section of the coast a berth of at least 1 mile. About 2 miles W of Puukole Point and 0.9 mile offshore is a reef with reported depths of 12 feet over it. A mile S of this reef and 0.8 mile offshore is a rock with 5 feet of water over it.

Kaula, 19 miles SW of Niihau, is a small, bare, rocky islet, 550 feet high. Vessels have anchored close to both the S and E sides of Kaula in depths of about 20 fathoms, but as the islet is only 0.7 mile long, little protection is afforded. A rock with a least depth of 5 fathoms is 3.8 miles 300° from the highest point on Kaula. A bank with depths of 30 to 40 fathoms extends 5 miles NW from the islet.

The **danger zone** of an aerial bombing and strafing target is centered on Kaula. (See 204.223, chapter 2, for limits and regulations.)

Chart 540.–Outer Islands. The small rocky islands, reefs, and atolls WNW from Niihau form a well-defined chain in the Hawaiian Archipelago. Between Niihau and Gardner Pinnacles, 480 miles distant, are several widely separated high barren rocks; continuing W are the coral reefs and atolls.

The Hawaiian Archipelago from longitude 161°W. to 176°W. is part of the **Hawaiian Islands National Wildlife Refuge**, and under the jurisdiction of the U.S. Fish and Wildlife Service, Department of Interior. The islands and atolls in the refuge include Nihoa Island, Necker Island, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan Island, Lisianski Island, Pearl and Hermes Reef, and all intervening reefs and shoals, which are also part of the so-called Leeward Islands.

The refuge was established in 1909 in order to preserve wildlife including very rare forms, found in the area. All fish and wildlife are protected. Federal laws governing wildlife and national wildlife refuges are in force. Sharks are abundant throughout the refuge. Entry to the refuge is **prohibited** except by permit issued by the Refuge Manager, Hawaiian/Pacific Islands National Wildlife

Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, P.O. Box 50167, Honolulu, Hawaii 96850. Entry upon Tern Island of French Frigate Shoals and Green Island, Kure Atoll, must be also by approval Commander, 14th U.S. Coast Guard District, Honolulu. The restrictions apply to all civilian and military agencies, as well as individuals. Because of the extreme fragilities of the refuge islands ecosystems general public use is not permitted. Entry to the entire refuge is restricted to scientists on previously U.S. Fish and Wildlife approved research projects.

Areas to be avoided.–The Maritime Safety Committee of the Inter-Governmental Maritime Consultative Organization (IMCO) has adopted certain areas to be avoided in the region of the Hawaiian Islands National Wildlife Refuge. To avoid the risk of pollution due to an accident in these areas, all vessels of more than 1,000 gross tons carrying cargoes of oil or hazardous materials should avoid the areas within a circle having a radius of 50 miles centered upon the following geographical positions: Pearl and Hermes Reef (27°50'N., 175°50'W.); Lisianski Island (26°00'N., 173°55'W.); Laysan Island (25°45'N., 171°45'W.); Maro Reef (25°25'N., 170°35'W.); Gardner Pinnacles (25°00'N., 168°00'W.); French Frigate Shoals (23°45'N., 166°15'W.); Necker Island (23°35'N., 164°40'W.); Nihoa (23°05'N., 161°55'W.).

Atolls.–An atoll may comprise one or more low coral islands situated on a strip or ring of coral surrounding a central lagoon. Many of these atolls have openings in the coral ring that permit passage of small boats, and sometimes large vessels, to anchorage in the enclosed lagoon.

Reefs.–Successful navigation through or among coral reefs often depends on the eye. They are always more plainly to be seen from the masthead than from the deck or bridge. The best observing conditions are with the sun high and behind the observer, and with the sea slightly ruffled; reefs are extremely difficult to distinguish if the sea is glassy calm.

Reefs with about 3 feet of water over them appear light brownish in color; those with a fathom or more appear light green, deepening to dark green and finally deep blue. Under favorable circumstances, a reef with depths of 3 or 4 fathoms over it can be seen from aloft for a considerable distance; in greater depths, the reef can only be seen when nearly over it. Polaroid glasses have been found of great help in navigating among reefs.

Vigias.–A vigia is an indication on a chart that a dangerous rock or shoal is thought to be near the spot indicated. Doubtful navigation and strong currents account for a large proportion of the vigias that encumber or have encumbered the charts of the Pacific Ocean. Phosphorescence, seaweed scum, and shoals of fish often resemble reefs and breakers so closely as to deceive the most experienced. Many vigias have been disproved by extensive investigation, but many others are still on the charts and remain a source of annoyance to the navigator.

Chart 19016.–**Nihoa** (23°03' N., 161°55' W.), a barren, rocky, and uninhabited island, is about 120 miles NW of Niihau. The island was discovered by Captain Douglas of the British vessel IPHIGENIA on April 13, 1790. The low, stone walls of ancient Polynesian ceremonial sites still remain on the island. The island is inhabited by a number of species of sea birds and two extremely rare land birds.

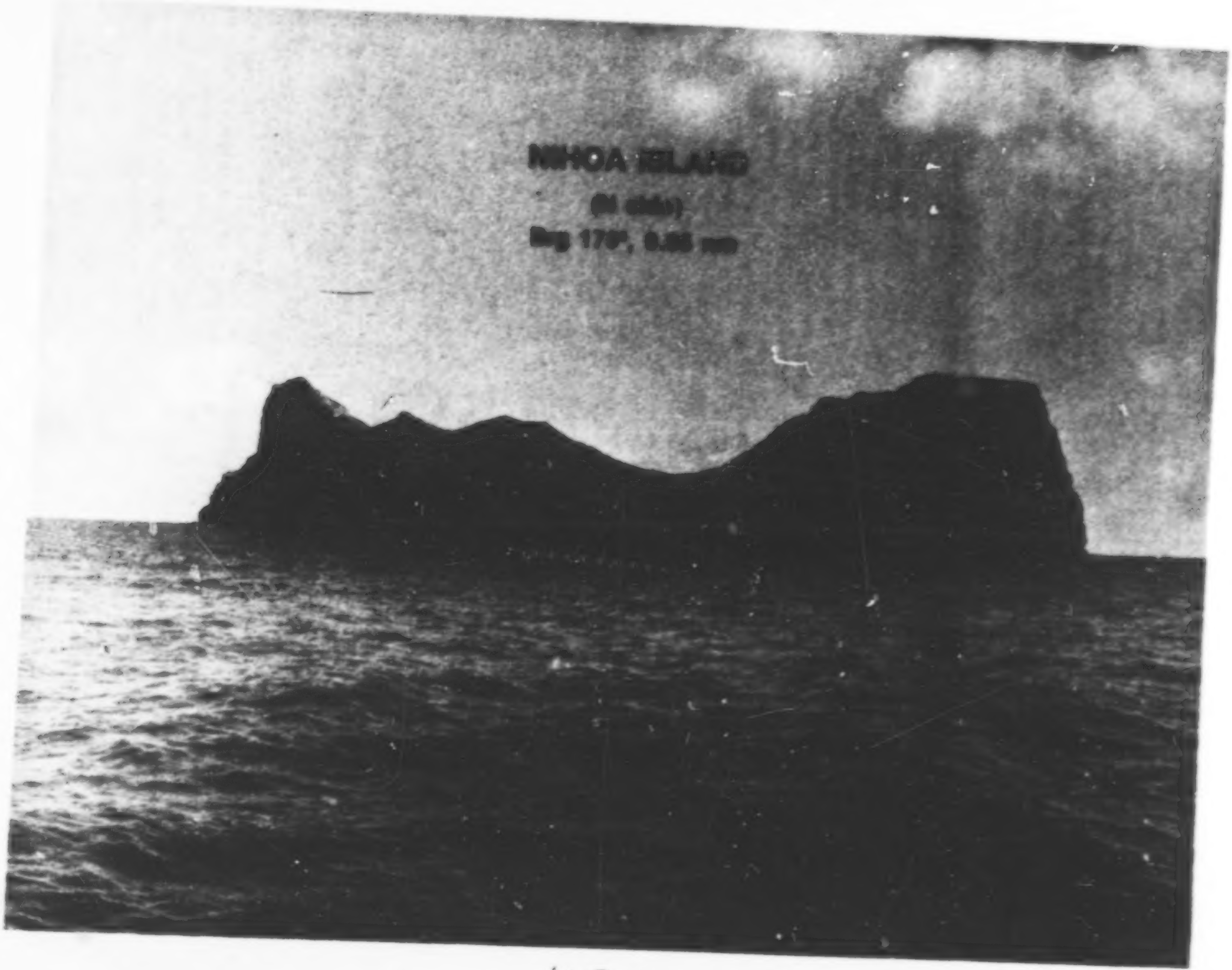
Nihoa is about 0.8 mile long and 0.2 mile wide. The E, N, and W sides are high and precipitous; the S side is much lower and its slopes are more gradual. **Millers Peak,** 910 feet high and the highest point on the island, is near the NW end. **Tanager Peak,** 874 feet high, is near the NE end. The SE and SW sides of the island terminate at points on either side of **Adams Bay.** In the bay are three small bights; the westernmost has a sand beach, and the shores of the other two are rocky ledges. There is deep water, close to all sides of the island.

The safest anchorages are between the 15-and 20-fathom curves W and SW of the island, but the holding ground is poor. The middle cove of Adams Bay probably affords the best landing, but the surge is considerable and great care must be taken in landing anywhere on the island. During heavy NW weather landing is very dangerous. A steep trail leads from the middle cove to the top of the bluff. At the foot of the bluff is a seepage of water that is not suitable for drinking purposes except in emergencies.

Currents.–The prevailing current sets W in the vicinity of Nihoa Island. Current observations taken about 0.2 mile W of the island show a nontidal flow of about 0.2 knot setting WSW combined with a tidal current of nearly 0.5 knot at strength setting N and S. The N strength of the tidal current occurs about 6 hours after the local transit of the moon and the S strength at about the time of local transit. The velocity measured was nearly 2 knots and set S.

Local magnetic disturbance.–Differences from normal variation of as much as 33° have been observed on Nihoa.

Nihoa is near the SW end of a bank which is about 18 miles long in a NE-SW direction 10 miles wide and has depths of 14 to 36 fathoms, except for a reported depth of 6½ fathoms at the westernmost extremity. Another bank, the center of which is about 18 miles WSW from Nihoa, is about 14 miles long in an E-W direction, 9 miles wide, and has depths of 15 to 25 fathoms, except for an 11-fathom depth about 2 miles SE of its center, and a 14-fathom depth about 6 miles SSE of its center, reported in 1968. A bank about 54 miles SE of Nihoa has a least depth of 32 fathoms except for a reported depth of 19 fathoms at its S end; the positions of the reported depths are approximate and caution is advised. The two banks 57 and 70 miles W of Nihoa have least depths of 29 and 33 fathoms, respectively. The edges of the bank slope

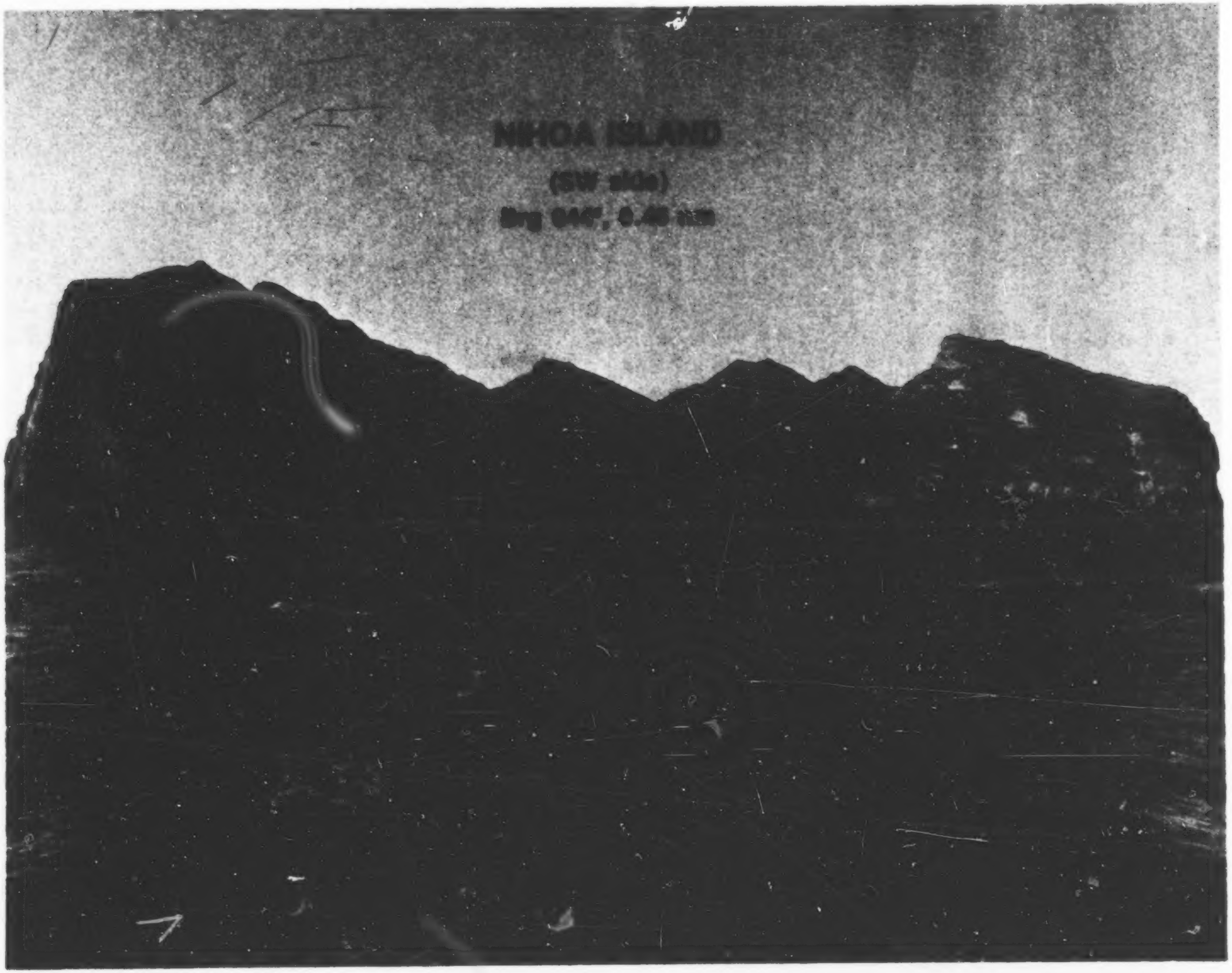


NIHOA ISLAND

([illegible])

Brg 179°, 0.85 nm

420


NIHOA ISLAND
(SW side)
Brg 044°, 0.45 nm

steeply to much greater depths. A 9-fathom shoal is about 5 miles NW of the E bank.

Necker Island (23°34'N., 164°42'W.) is 158 miles W from Nihoa. It was discovered by La Perouse on November 1, 1786, and was annexed to Hawaii in 1895. The island, which might well be called a rock, is uninhabited, but, like Nihoa, shows unmistakable evidence of ancient habitation. It is the home of countless sea birds.

About 0.7 miles long and less than 0.2 mile wide, Necker Island is made up entirely of lava. There are four peaks or hills, one near each end and two between. The highest, **Summit Hill,** 277 feet high, is near the middle of the island. **Annexation Hill,** 249 feet high, at the W end of the island, is separated from the other hills by a low saddle and, when seen from a distance appears detached. There is a sparse growth of low brush on the upper slopes of the hills.

Northwest Cape, a rocky spur extending N from the W end of the island, is joined to the rest of the island by a low isthmus over which the seas break in rough weather. On the W side of the cape is **West Cove,** and on the E side is **Shark Bay**. Off the E end of the island are several low, detached rocks. A depth of 5 fathoms has been reported 0.5 mile S of Necker Island where general depths are 10 to 12 fathoms.

Vessels can anchor in depths of about 12 fathoms 0.5 mile S of the SW point of the island, but the island is so small that it affords little protection. West Cove and Shark Bay are the landing places, and are usually very hazardous and there are times when it is impossible to land anywhere on the island. During heavy NW weather landing at West Cove is very dangerous. Shark Bay, open to the NE trades, is usually filled with breakers. Small seepages of unpalatable water have been found on the island.

Tide.–The rise and fall of the tide is about 1 foot.

Currents.–The prevailing current sets W, but countercurrents may be expected close to the island. Four days of current observations taken 0.2 mile WNW of the W end of Necker Island show a W nontidal flow of about 0.5 knot, combined with a tidal current of about 0.8 knot at strength. E trade winds prevailed during the observations.

Weather.–September is reported to be the calmest month of the year; strong N and NE winds prevail during the other months.

Local magnetic disturbance.–Differences from the normal variation of as much as 22° have been observed on Necker Island.

Necker Island is near the N end of a bank about 40 miles long in a NW-SE direction. The bank is about 15 miles wide and has depths of 8 to 23 fathoms except for a reported 5-fathom depth 0.5 mile S of Necker Island and a 5-fathom depth reported in 1968 about 5 miles N of Necker Island. The sand and coral bottom is plainly visible. A 10-fathom shoal has been reported about 19 miles NE of Necker Island.

Charts 19401, 19402.–French Frigate Shoals, about 85 miles W from Necker Island, is a crescent-shaped atoll about 17 miles long in a NNW direction. It was discovered by La Perouse on November 6, 1786, the day after leaving Necker Island, and like that island, was annexed to Hawaii in 1895. The atoll consists of a coral reef with a number of small, bare, sand islets on it, and is flanked by a volcanic rock and numerous coral heads and reefs. It is home to many sea birds, seals, turtles and other fish and wildlife all protected by Federal Law.

La Perouse Pinnacle and Tern Island are the best landmarks. The other islands are of little assistance in navigation due to their constantly changing size and shape and low elevations. Shark Island has been observed to be particularly unreliable in this regard.

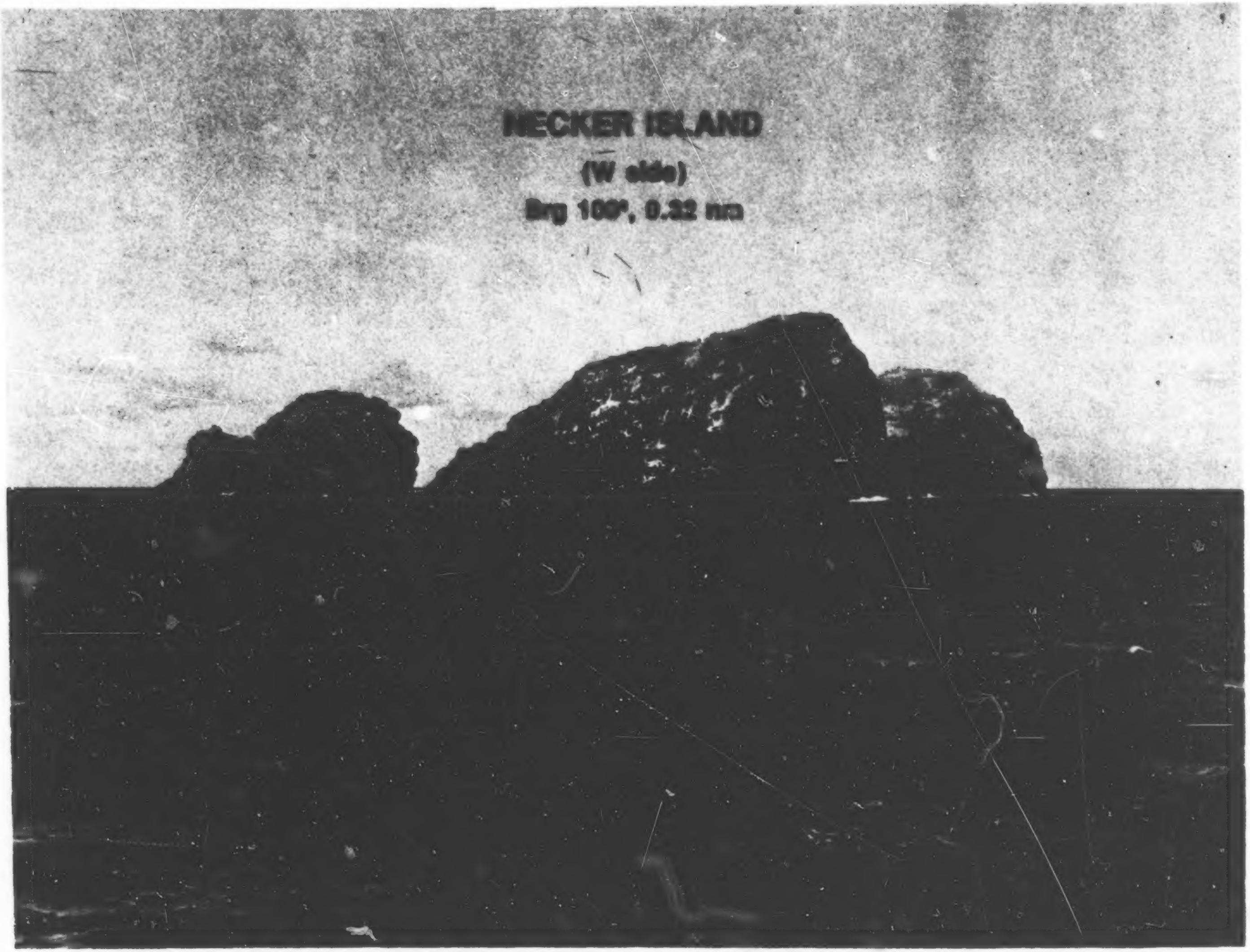
The crescent reef is double, and the outer and inner arcs bound a lagoon that is 1 to 6 miles wide. At its midpoint the windward reef lies about 8 miles from a line joining the tips of the crescent; the leeward reef is about 5 miles from this line. The windward reef is nearly continuous and can be plainly seen in the daytime for a considerable distance by vessels approaching from the N, E or SE. The sea practically always breaks over the reef, and during the few times it is not breaking, the green shoal water inside the reef is seen in ample time to avoid danger. The bottom slopes uniformly from the reef to the 100-fathom curve 1 to 2 miles off, and there are no known dangers from N through E to S of the windward reef.

The leeward or inner reef, however, is broken in many places and in normal weather is seldom marked by breakers. The lagoon between the reefs is very foul with numerous coral heads, some just under the surface of the water.

A bank with depths of 8 to 20 fathoms extends about 8 miles W from the midpoint of the inner reef, where it then drops off rapidly to great depths.

La Perouse Pinnacle (23°46'N., 166°16'W.), a volcanic rock about 60 yards long, 20 yards wide, and 122 feet high, lies about midway between the tips of the crescent and W of the leeward arc of the reef. The rock is so steep and rugged that is almost inaccessible. From a distance its guano-coated outline resembles a brig under sail. A small detached lava rock about 9 feet high lies off the W side of the pinnacle. The points of the crescent reef, as indicated by the ends of the line of breakers, bear about 170° and 310° from La Perouse Pinnacle. La Perouse Pinnacle is reported to be the first object sighted, generally, when approaching the atoll, and that it is usually picked up on radar at 12 to 15 miles.

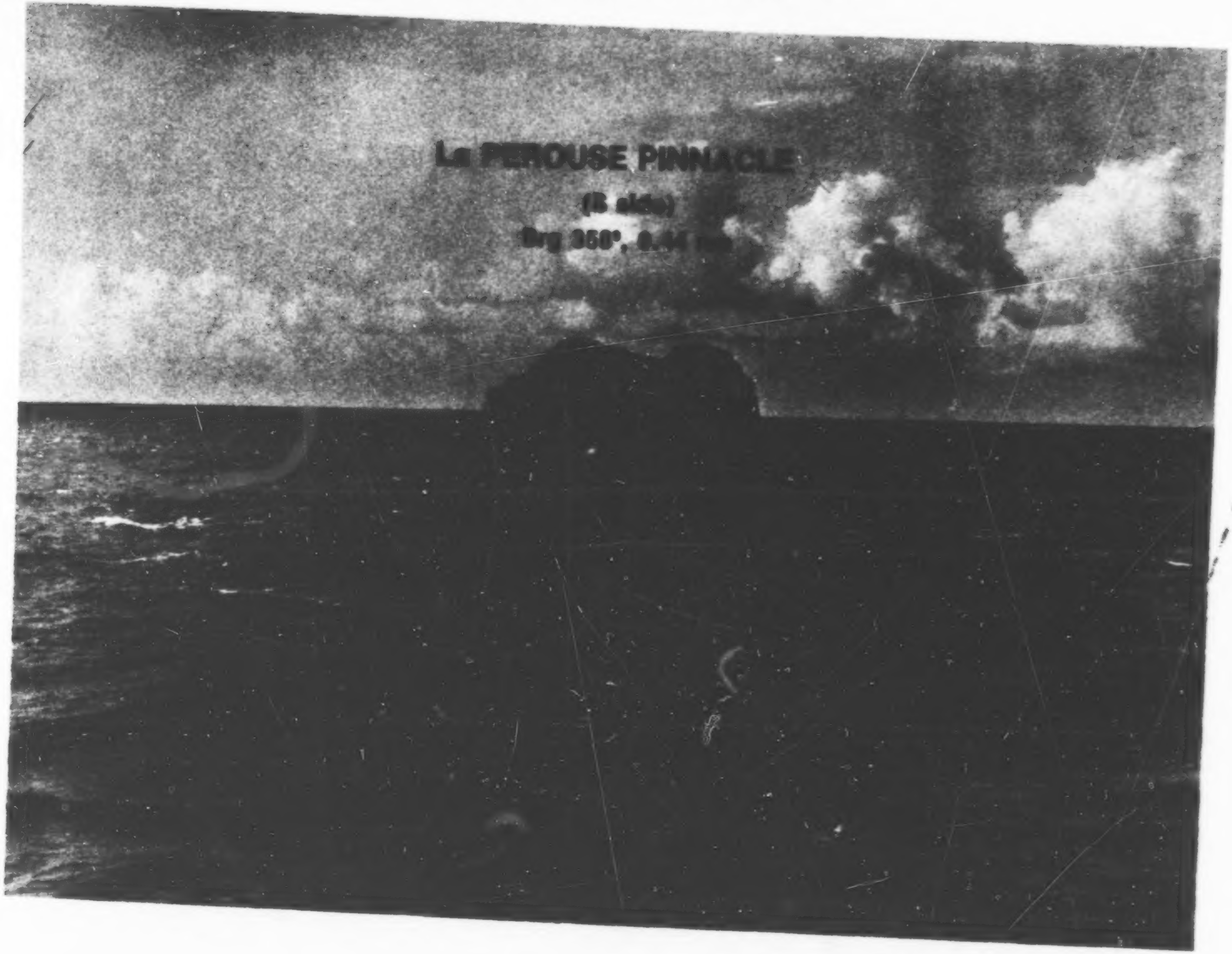
Shark Island, the northwesternmost of the sand islets, lies 6 miles NW of La Perouse Pinnacle. A coral reef fringes the island. **Tern Island,** about 2 miles ENE of Shark Island, is marked by two 40-foot towers, low concrete buildings, a wooden telegraph pole, and four large trees. The island and buildings are visible at 8 and 5 miles, respectively. There are no facilities on the island.



NECKER ISLAND
(W side)
Brg 100°, 0.32 nm

423

BEST DOCUMENT AVAILABLE


La PEROUSE PINNACLE
(S side)
Brg 360°, 0.44 nm

East Island, 3 miles ENE of La Perouse Pinnacle, is a low sand bar 600 yards long in a NW direction and about 100 yards across. Reefs that are awash most of the time extend a mile W and 0.2 mile S from the island; the S reef seldom breaks. A coral head that sometimes breaks is 0.6 mile S of East Island. NE and E of the island are numerous coral heads and reefs.

Extreme caution must be exercised when navigating in the vicinity of these islets because of the numerous coral heads.

Channels.–The principal approach to Tern Island is through a natural channel that leads to a lagoon and anchorage SE of the island. Entry into the lagoon is through an opening in the reef indicated by the 3¼-fathom sounding in 23°51'09"N., 166°16'27"W., on chart 19402. Mariners are advised that attempting entry into the lagoon requires extensive local knowledge, good sea and weather conditions, and the sound judgment to recognize when conditions allow committing the vessel to a course through the reef opening.

Anchorages.–The best holding ground SW of French Frigate Shoals is in depths of 13 to 15 fathoms, sand bottom; in lesser depths the bottom is mostly coral. There are no all-weather anchorages for large vessels, but the conformation of the reef is such that some protection can be found from choppy seas and ground swell. Small vessels can find good protection from most weather behind the shoals and coral heads.

Routes.–Vessels approaching French Frigate Shoals from the N, E, or SE in the daytime should have no difficulty in picking out the outer reef from a considerable distance off. La Perouse Pinnacle, plainly visible from outside the reefs in clear weather, is reported to make a good radar target at 19 miles. From the S, the reef is not so easily seen. The sea may not break over the shoals, and although the bottom is plainly visible close in, the shoals might not be detected from a short distance. The 100-fathom curve is only about 0.5 mile from the shoals.

Currents.–A prevailing current sets W in the vicinity of French Frigate Shoals, but variable currents have been noted. A SW current of 2 knots has been measured. A 1-day series of half-hourly current observations taken 0.7 mile W of the S end of the shoal during a period of small wind velocity shows practically no current.

Weather.–The NE trades prevail throughout the year, but W blows can be expected during the winter. The average wind velocity is 12 knots, with monthly averages of about 16 knots in December to 9.5 knots in August. Gales have been experienced in July and September. Occasional heavy showers of short duration cut visibility to about 2 miles.

Chart 19019.–Brooks Banks and **St. Rogatien Bank** are a group of five coral banks between French Frigate Shoals and Gardner Pinnacles. The banks extend 50 miles in a NW direction, have depths of 11 to 59 fathoms, and are separated by channels several miles wide and more than 100 fathoms deep. The largest of these banks lies 60 miles 305° from La Perouse Pinnacle, is about 12 miles in diameter, and has depths of 12 to 56 fathoms. The southeasternmost bank, the smallest in the group, is 27 miles 297° from La Perouse Pinnacle, is about 2 miles in diameter, and has depths of 28 fathoms. The northwesternmost bank is 75 miles 311° depths of 30 to 43 fathoms.

Unprotected anchorage can be had on the shoaler areas, but the holding ground is only fair. The sand and coral bottom is plainly visible. There are no known dangers.

Currents.–The oceanic flow is variable, but usually sets W. Sixty half-hourly current observations indicate a NW nontidal current of about 0.5 knot, combined with a tidal current of 0.8 knot at strength. The tidal current is somewhat rotary, turning clockwise. The largest velocity observed was nearly 1.5 knots setting W.

Chart 19421.–Gardner Pinnacles (25°00'N., 168°00'W.) are 120 miles NW of La Perouse Pinnacle. They were discovered by Captain Allen of the whaler MARO in June 1820. The pinnacles are solid, volcanic rocky islets; the larger pinnacle is 190 feet high and about 200 yards in diameter, and the smaller about 100 yards from the NW side of the larger. The rocks are barren of vegetation and are covered with guano, giving them a snow-capped appearance. The only off-lying dangers are a small rock just off the NW side of the larger pinnacle and two 20-foot patches, one of which is about 100 yards S of the larger pinnacle and the other just N of the smaller pinnacle. From an E approach, the pinnacles are reported visible at a distance of 20 miles.

Anchorage can be had anywhere on the bank which surrounds the pinnacles, but there is no protection; in general, the holding ground is poor. In comparatively smooth weather, landings can be made just N of the bight on the W side of the larger pinnacle. Because of its exposed position, most times the surf breaks high up its sides and landings are extremely hazardous and generally impossible. Some sea birds nest on its higher elevations.

Currents.–Current observations taken at a number of locations in the vicinity of Gardner Pinnacles show a WNW oceanic drift of about 0.2 knot combined with a rotary tidal current, turning clockwise, of 0.2 knot at strength. Velocities of about 2 knots setting WSW were measured during E winds.

Gardner Pinnacles lie near the NE side of a bank about 50 miles long, in a N-S direction, and about 20 miles wide near the N end. The bank has depths of 10 to 25 fathoms, and the sand and coral bottom is plainly visible.

Chart 19019.–Raita Bank (25°32'N., 169°28'W.), is about 85 miles 291° from Gardner Pinnacles. It was discovered in 1921 by the French schooner RAITA. The bank is about 20 miles long in a NNE

direction and has a maximum width of about 10 miles. Depths range from 9 to 20 fathoms, and the sand and coral bottom is plainly visible under ordinary weather conditions. At the 20-fathom curve, the bottom drops off rapidly to great depths. In heavy weather, the swells seem to lump up slightly over the shoaler areas, but there are no known dangers. Large schools of ulua fish and sharks have been observed on the bank. Anchorage can be had on the bank in the open sea with fair holding ground.

Currents.–Variable currents are reported in the vicinity of Raita Bank. Observations in the vicinity indicate a rotary tidal current turning clockwise.

Chart 19441.–Maro Reef (25°25′N., 170°35′W.), is about 60 miles W of Raita Bank. It was discovered by Captain Allen of the whaler MARO in June 1820. The large, oval-shaped, coral bank is about 31 miles long in a NW direction and about 18 miles wide. The center of the bank is a large area of reefs awash. This broken area, about 12 miles long in a NW direction and 5 miles wide, is extremely foul, with many coral heads awash and channels of deep water between. Only one very small rock, about 2 feet high and on the N side of the reef, shows above high water. Outside the broken portion of the reef, which is practically always marked by breakers, is the wide shelf of the bank with depths of 12 to 20 fathoms.

Breakers, or the light blue-green color of the area within the broken portions of the reef, give the first warning of the proximity of danger. All maneuvering in the vicinity of the broken area must be done with extreme caution and with the sea and light such that shoal spots can be seen and avoided. Ordinarily, spots with less than 6 fathoms of water are plainly visible.

There are no known dangers more than 2 miles from the general outline of broken portions of Maro Reef, thus leaving a navigable shelf with depths of 12 to 20 fathoms on all sides but the NE where depths of 7 to 10 fathoms are found.

Vessels may anchor in the shelter of the broken portion of the reef on any side; the closer to the reef the more caution is necessary to avoid the isolated coral heads, which can usually be seen only in favorable sunlight. Good shelter from the NE trades can be had on the W side between two long arms of the reef which project, one to the NW and one to the SW, from the main reef area. Care must be taken to avoid the 5¾–fathom spot off the middle of the entrance and the 4¼-fathom spot well inside. In August 1977, numerous uncharted coral heads were reported in the approach to this anchorage. In August 1978, the NOAA Ship TOWNSEND CROMWELL reported position discrepancies inside the anchorage. Because of the recent reports of position discrepancies and uncharted obstructions, extreme caution should be exercised while in the general vicinity or approaching the reef. Vessels entering should keep within 0.5 mile of the SW arm of the reef. However, unless the navigator is familiar with the area, he should remain as far as he can from the broken area on all sides and still obtain the desired shelter.

Currents.–In the vicinity of Maro Reef the prevailing current sets W, but variable currents have been noted. Over the bank a rotary tidal current, turning clockwise, has been reported.

Charts 19442, 19019.–Laysan Island (25°46′N., 171°44′W.) is a low sand island about 65 miles WNW of Maro Reef. The island is 1.6 miles long in a N-S direction, about 1 mile wide, and 35 feet in elevation at its highest point near the N end. In the center of the island is an extremely hypersaline foul smelling lake about 0.9 mile long. The island, mostly soft white sand, is partly covered with low vines and grass, and walking over it is tiring because of innumerable sea-bird nesting holes. The island is marked by an ironwood tree behind a wooden refuge warning sign on the W side of the island, and by a grove of coconut palms on the N edge of the lake. The wreck of a steel fishing boat is on the S shore of the island in 25°45.4′N., 171°44.4′W., but does not present a good radar target. Water can be obtained by digging shallow wells. The island is uninhabited and is seldom visited. As with other islands in the Leeward Islands, an entry permit is required. It is home to countless sea birds. Millions of flies make a visit there unpleasant most of the year.

A coral reef, a few hundred yards wide, fringes the island. About 0.3 mile off the NW shore is a small, sharp rock, about 3 feet high. Coral heads, covered with 4 to 7 fathoms of water, are numerous in the area within 1 mile of the island. The sand and coral bottom can usually be seen in depths less than 10 fathoms, and often in greater depths. When approaching closer than 1 mile, a sharp lookout must be maintained to detect the coral heads.

Vessels can anchor in depths of 8 to 15 fathoms 1 to 1.5 miles off the island on all sides, depending upon which side affords the best protection. During the trades, anchorage can be had 0.5 to 1 mile off the W side in depths of 8 to 15 fathoms, fair holding ground. In 1976, the Coast Guard Cutter MALLOW found good anchorage in 45 feet of water, sand and coral bottom, in 25°46′22″N., 171°45′15″W., with the ironwood tree bearing 084°, 1,390 yards. However, the anchor chain is subject to fouling on the coral heads because of the rotary currents. Small craft drawing not over 12 feet can lie at anchor inside the reef and off the ironwood tree on the W side of the island, but this anchorage affords no protection from W winds. In February-March 1978, the NOAA Ship TOWNSEND CROMWELL found anchorage with good holding ground, sand and coral bottom, and fair protection from strong W and NW winds accompanied by heavy seas and swell in 25°46.3′N., 171°43.0′W. and 25°45.8′N., 171°43.5′W. Surf of 10 to 15 feet was observed breaking on the W side of the island, and a 3 to 5–foot surf was observed on the reefs on the E and NE side.

During NE and SE weather, the best landing can be made off the ironwood tree on the W side of the island on a sloping sandy beach. A poor landing can be made near the NE end of the island during light W winds. Caution is advised when attempting a landing on this side of the island. Clear sand beaches are almost nonexistent, and approaches to the beach must be made between breakers on the outer reef and the shore. Summer is the best for landing, as the NE trades prevail during this period.

Currents.–A current velocity of about 1 knot and a rotary tidal current, turning clockwise, have been reported. The current is believed to depend to a great extent upon the wind. In 1976, the Coast Guard Cutter MALLOW observed the current to round the S side of the island in a clockwise direction on the flood; and to round the N tip of the island in a counterclockwise direction on the ebb.

Laysan Island is just SE of the center of a circular bank 14 miles in diameter, with depths of 9 to 23 fathoms, beyond which the water deepens rapidly.

Northampton Seamounts, unsurveyed seamounts with a least known depth of 17 fathoms, are about 35 miles SW of Laysan Island.

Charts 19442, 19022.–Lisianski Island (26°04′N., 173°58′W.) is a small, low, sandy island, about 120 miles W of Laysan Island. Captain Lisianski, of the Russian ship NEVA, discovered the island on October 15, 1805, when his ship grounded on the reef and was nearly wrecked. The island is about 1.2 miles long in a NNW direction, 0.5 mile wide, and 20 feet in elevation at its highest point on the NE side. The shores are white sand except for two stretches of rock ledge at the waterline on the E side of the island. Behind the sand beach, the island is overgrown with vines and bushes. One coconut palm tree in the NE part of the island is prominent from N. In 1976, a small boat was reported wrecked on the NE end of the island and two groves of palm trees were observed near the middle of the island. Brackish water may be obtained by digging shallow wells. Large numbers of sea birds nest on the island, and, as at Laysan, large numbers of flies make a stay there unpleasant. The island is uninhabited and seldom visited. Visits should be made during the summer, when the NE trades prevail, but small-boat landings have been made on the E side of the island at other times, although this is very risky.

A reef circles around to the SW from off the N side of the island. It is marked near its offshore end by a coral ledge that bares at times and over which the seas break. The S end of this ledge is 1.7 miles 260° from the N end of the island. About 0.5 mile SW of this point is another ledge which is marked by a breaker in most weather. Midway between these ledges or breakers is a passage leading to the lagoon between the island and the reef. The passage has an uneven bottom with depths of 11 to 22 feet. About 350 yards SW of the N ledge is a small shoal with a depth of 3 feet over it. These shoal spots are easily seen and avoided by small boats making the passage into the lagoon, but vessels should not enter without local knowledge. Once inside, anchorage can be had in depths of 3 to 6 fathoms, taking care to avoid the scattered coral heads with only a few feet of water over them. Landing can be made on the W side and S end of the island in all but SW and W weather.

Neva Shoal, with innumerable coral ledges, extends about 8 miles SE from Lisianski Island. This reef, which is about 4 miles wide, has its W extremity about 4 miles SSW of the island. The S end of the reef is usually marked by breakers, and many of the ledges break in almost all weather. The shoal has areas of deeper water between the ledges, and small boats can maneuver but with difficulty over many parts of the reef. It must be avoided entirely by larger vessels.

In addition to Neva Shoal, there are many coral heads with depths of 3 to 6 fathoms over them within 3 miles of all sides of the island. A small coral ledge, with an islet on it and nearly always marked by breakers, is 2.7 miles 254° from the S end of the island. Between this ledge and the island are depths as great as 8 fathoms and a scattering of coral heads, some of which are nearly awash. The lagoon could be entered between this ledge and the ledge marking the S side of the previously described opening 1 mile N. A rock covered 14 feet, about 1.5 miles NNE of the island, is marked by breakers only during heavy weather. Under favorable conditions dangerous coral heads can be seen for several hundred yards.

Anchorage can be had in trade-wind weather about 3 miles W of the island in depths of 11 to 15 fathoms, sand and coral bottom, with the N end of the island bearing 080°. During SW weather, vessels can find anchorage 3 to 4 miles E of the N end of the island in depths of 8 to 15 fathoms. Small boats can anchor in the lagoon, as described previously.

Vessels may approach to within 3 miles of Lisianski Island from the N on courses between 270° and 090°. The island and Neva Shoal should be given a wide berth when passing S of them, as the island is seldom seen from the S limits of the shoal. Vessels approaching from the SW should keep about 5 miles W of the meridian of the island until the island bears 090°, and then approach the anchorage.

Currents.–One-half day of current observations taken 3 miles W of Lisianski Island indicate a rotary tidal current, turning clockwise, of 0.8 knot velocity at strength. A prevailing NW current is reported in the vicinity of the island.

Lisianski Island and Neva Shoal lie just SE of the center of a bank about 25 miles long in a NW direction and about 15 miles wide. Outside the reefs, general depths on the bank are 9 to 47 fathoms.

Pioneer Bank (26°02′N., 173°26′W.) is about 30 miles E of Lisianski Island. The bank is about 8 miles in diameter, and soundings of 18 fathoms have been obtained near its center. No breakers or dangers were observed during a preliminary survey, but, as the least depth may not have been obtained, vessels should avoid the area.

An unsurveyed bank with least known depths of 30 fathoms is reported to be about 36 miles NW of Lisianski Island.

Chart 19461.–Pearl and Hermes Reef, about 145 miles NW of Lisianski Island, is an extensive oval-shaped atoll about 40 miles in circumference, 17 miles long in a NE direction, and 9 miles wide. The reef was discovered on April 26, 1822, by the British whalers PEARL and HERMES, which were wrecked on the same night within 10 miles of each other. Within the outer reef is a lagoon in which are numerous coral reefs with deep water between. The remains of a wreck stranded on the E side of the reef are still visible, but over the years most have been beaten down by breakers. There are no known dangers outside the heavy breakers on the outer reef.

Within the outer fringing reef are several small islets, most of which are on the S side; the exception is **North Island.** There are also several sandbanks that are awash at high water. **Southeast Island** (27°47′N.,175°49′W.) is the largest of the group; five other named islands are scattered along a 7-mile stretch to W. The islands are uninhabited and are vegetated with low plants and shrubs. Large numbers of sea birds nest on the islands.

The 6-mile opening on the NW side of the outer reef has depths of 1 to 6 feet between the numerous coral heads, and is hazardous to negotiate with a small boat. The small-boat channel between Southeast Island and **Bird Island,** next islet to the W, has a least depth of 4 feet; the channel between Bird Island and **Sand Island** has 19 feet. Lagoon entrance or navigation are definitely not for the amateur.

Anchorage can be had off the W entrance to the lagoon in depths of 8 to 12 fathoms, or on the E side of the reef. Vessels have anchored midway between the S entrances and about 0.6 mile off Bird Island in depths of 25 fathoms.

Currents.–The current appears to set N between Lisianski Island and Pearl and Hermes Reef.

Chart 19022.–Salmon Bank is about 60 miles SW from Southeast Island on Pearl and Hermes Reef. The least known depth on the bank is 30 fathoms.

Gambia Shoal, position doubtful, is about 50 miles WNW of Southeast Island on Pearl and Hermes Reef. The shoal has a depth of 14 fathoms, and the bottom can be plainly seen. About 25 miles N of the charted position of Gambia Shoal is **Ladd Seamount,** a bank with a least known depth of 35 fathoms.

Charts 19480, 19481.–Midway Islands, 1,150 miles WNW of Honolulu, were discovered in 1859 by Captain N. C. Brooks, an American shipmaster on the Hawaiian vessel GAMBIA; possession was taken on behalf of the United States on September 30, 1867, by Captain William Reynolds of the U.S.S. LACKAWANNA. The circular atoll is 6 miles in diameter and encloses two islands. The coral reef does not completely enclose the lagoon; there is a natural opening on the W side, and another opening has been dredged on the S side. The reef rises abruptly from deep water and there are no off-lying rocks or shoals; breakers mark all seaward sides of the reef. The enclosed islands average 12 feet high with a maximum height of 45 feet. Numerous birds, especially albatross, nest on the islands and are sometimes a hazard to landing or departing airplanes.

The Midway Islands, not a part of the State of Hawaii, are within a **Naval Defensive Sea Area** established by Executive Order No. 8682 of February 14, 1941. The order says in part:

"The territorial waters between the extreme high-water marks and the 3-mile marine boundaries surrounding Midway Islands, in the Pacific Ocean, are hereby established and reserved as naval defensive sea areas for purposes of national defense.

"At no time shall any person, other than persons on public vessels of the United States, enter any of the naval defensive sea areas herein set apart and reserved, nor shall any vessel or other craft, other than public vessels of the United States, be navigated into any of said areas, unless authorized by the Secretary of the Navy."

Permission to enter the Naval Defensive Sea Area must be obtained in advance from the Commanding Officer, Naval Air Facility, Midway Island, FPO San Francisco, Calif. 96614.

Eastern Island, at the SE end of the atoll, is triangular in shape, about 1.2 miles long, and 6 to 12 feet high.

Sand Island, on the S side of the atoll, is about 2 miles long in a SW direction and is composed of white coral sand. Prominent from offshore are the towers, tanks, and radio masts of the naval installations and a group of trees on the N side of the island. An aerolight is on top of the tallest tank in the N central part of the island.

Welles Harbor is the area inside the gap in the barrier reef on the W side of the atoll. The harbor was formerly used to a considerable extent as an anchorage by ships calling at Midway, but since the dredging of the ship channel and harbor between Sand and Eastern Islands, Welles Harbor is little used. Navigation in this area should not be attempted.

Channels.–Marked dredged channels through the S reef lead to deepwater basins on the E and NE sides of Sand Island, and to a small-craft basin on the W side of Eastern Island. **(Consult Naval authorities for latest controlling depths in channels and alongside piers.)**

Anchorages.–The established anchorage area is NE of Sand Island. Outside anchorage is available in depths of 15 to 25 fathoms E of the main channel sea buoy; this anchorage is fair during NE winds, but should not be attempted during winds from other quadrants. Anchorage S of Sand Island is prohibited to avoid possible fouling of the San Francisco-Honolulu-Midway-Guam-Manila cable.

Routes.–Vessels approaching Midway Islands are warned that the islands and surrounding waters out to the 3-mile limit are restricted. In approaching from any direction vessels will remain 3 miles off until S of the entrance. They should then steer a N course heading directly between Sand and Eastern Islands until the channel is made out, then steer on the range. Due to the prevailing E winds and W set of current, caution must be exercised in entering. Drift and leeway should be anticipated, and sufficient speed should be maintained at all times to control the vessel. (See discussion of currents in the channel.)

Radar Navigation.–Radar and visual contact have been frequently made with the radio towers on Sand Island at distances in excess of 20 miles.

The best radar returns are the SE edge of Sand Island, the stranded wreck on E edge of the entrance channel, the radio towers on Sand Island, an unlighted platform on the N side of the atoll, and the W tip of Eastern Island.

Tides.–The mean range of tide is 0.8 feet and the diurnal range of tide is 1.2 feet at Midway Islands. The generally calm waters inside the reef are occasionally subjected to strong surge, and they can be extremely agitated by winter gales.

Currents.–The current off the main entrance channel usually sets W with a velocity of about 2 knots. Within the channels, the current changes direction with velocities of 2 to 8 knots, depending on the weather; extreme caution is necessary to avoid being carried outside the channel limits. It is reported that during heavy gales Welles Harbor is full of strong currents caused by the sea forced over the reefs.

Weather.–During the summer the winds are generally variable and light, either from NE, SE, or SW until about the middle of July, when fresh to strong NE trades set in, continuing through July and August. SW winds are always accompanied with a low barometer, rain, and squalls. Rain also comes occasionally with NE and SE winds and a high barometer. NW winds following SW storms generally indicate clearing weather.

During the winter from October to April, gales frequently occur, working around from SE through SW to NW. Occasionally a few days of fine weather will prevail, but a rough W sea is always present.

Pilotage.–All vessels, except U.S. Navy ships, are required to take a pilot; however, there is no resident harbor pilot at Midway. Harbor pilot services at Midway are provided by Naval Station Pearl Harbor. Both Naval Air Facility Midway Island and Naval Station Pearl Harbor must be notified at least 48 hours in advance of a vessels arrival at Midway. Direct communication between all concerned parties is authorized for scheduling ships for pilots at Midway Island. The pilot boards from a tug about 2 miles S of the sea buoy.

Harbor regulations.–Permission to enter Midway Harbor is given by the Harbor Control. Ships can contact the Harbor Control by voice on 2716 kHz. All vessels must await positive permission from the Harbor Control to enter or leave the harbor. Entry is prohibited during the hours of darkness, and the harbor is closed to all ships when the wind velocity exceeds 30 knots.

Harbor facilities.–Two deepwater piers are on the NE side, and one smaller pier is in the inner harbor on the E side of Sand Island; a small-craft pier is on the W side of Eastern Island.

Provisions, jet fuel (JP-5), and water are not available for commercial use, except in case of emergency. Limited emergency repairs can be made to vessels, but there are no drydocking facilities. Tugs are available; there is a 20-ton mobile crane for use in emergencies.

Chart 19480.–Unsurveyed **Nero Seamount,** with a least known depth of 62 fathoms, is about 30 miles WSW from Midway Islands. Continuing W for about 6 miles from Nero Seamount is **Pogy Bank,** also unsurveyed and with a least known depth of 41 fathoms. In 1976, however, depths of 38 fathoms were reported on Pogy Bank along a line extending from 27°58.3'N., 177°55.8'W. to 27°57.2'N., 177°58.2'W.

Chart 19483.–**Kure Island** (28°25'N., 178°20'W.) is 50 miles WNW of Midway Islands, which it closely resembles both in formation and appearance. The Kure atoll is 4.5 miles in diameter, and a nearly continuous coral reef encloses a lagoon in which reefs and coral heads alternate with deep water. A mile-wide break in the SW side of the barrier reef provides an entrance of sorts to the lagoon.

Good anchorage in 15 fathoms may be found on the NW side of the atoll.

Green Island, on the SE side of the atoll, has a highest elevation of 20 feet and is covered with scaevola brush. Entry upon the island must be by approval of the U.S. Coast Guard; this restriction applies to civilian and military agencies and individuals. Buildings of a U.S. Coast Guard loran station occupy the central area of the island; the 625-foot loran tower, 639 feet above the water, is a prominent landmark. The Coast Guard reports that Green Island presents a good radar target at 22 miles and the reef line presents a good target at 7.5 miles. Another good radar target, reported by NOAA Ship TOWNSEND CROMWELL, is a large wreck in about 28°27.0'N., 178°18.9'W., on the NE side of the atoll. W of Green Island are small sand islets, the largest of which is 8-to 10-foot-high **Sand Island.** These islands continually shift and change with weather and sea action.

The best anchorage is on the W side, at the SW corner of the atoll with depth of 8 to 15 fathoms, rocky bottom. Boats may then be taken to a concrete pier with 3 to 5 feet alongside, located at about the midpoint of the lagoon side of Green Island. Vessels also anchor about 0.3 to 0.5 mile SSW of the S tip of Green Island in depths up to 15 fathoms. Mooring buoys, about 0.3 mile offshore, mark a fuel oil pipeline terminus. Landings can be made in good weather through a break in the reef to a sand beach at the SW tip of Green

Island; depths to the landing are 5 to 6 feet between small coral heads and ledges. The loran station has a medical corpsman, and the island is provided with an airstrip and communications with Honolulu; no other services are available.

A bank with depths of 20 to 30 fathoms surrounds Kure Island. No dangers have been observed outside the reef; however, the reef is inadequately surveyed. From the appearance of the islands, it may be assumed that they are sometimes visited by severe storms, the sand being thrown into numerous cones and pyramids.

Currents.-A set to the S has been observed between Kure Island and Midway Islands. In the vicinity of Kure Island a continuous E current of about 2 knots during W weather has been reported.

Weather for Kure Island is similar to that for the Midway Islands.

Chart 19022.-In 1923, breakers were reported observed about 180 miles S of Kure Island in about 25°23'N., 178°04'W., by the American vessel ETHAN ALLEN. The master reported that the swell appeared to mount up and occasionally break as though over a shoal extending for about 2 or 3 miles in an E-W direction.

Charts 83157, 83116, 83484.-Palmyra Atoll (Palmyra Island), approaches to Palmyra Atoll, **Jarvis Island, Baker Island, Howland Island, American Samoa, Swains Island.**-Palmyra Atoll (Palmyra Island) is privately owned and permission must be obtained from the owner, A. Fullard-Leo, 1144 Akuila Place, Kailua, Hawaii, 96734, prior to entry.

Howland, Baker, Jarvis, and Rose Islands are National Wildlife Refuges under administrative responsibility of the U.S. Fish and Wildlife Service. Each refuge extends outward to the 3-mile limit. Entry into these refuges without a permit is prohibited, except in an emergency. Permits must be obtained from the Refuge Manager, Hawaiian/Pacific Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, P.O. Box 50167, Honolulu, Hawaii 96850. Descriptions of these outlying Pacific areas which are territories of the United States are included in Publication 80, Sailing Directions for the Pacific Islands, Volume III, The South-Central Groups, published by the Defense Mapping Agency Hydrographic/Topographic Center.

COLREGS Demarcation Lines.-The lines established for United States Pacific Island Possessions are described in 80.1495, chapter 2.

Charts 81664, 81048, 81054.-Wake Island and Island of **Guam.**-Descriptions of these outlying Pacific areas which are territories of the United States are included in Publication 82, Sailing Directions for the Pacific Islands, Volume I, The Western Groups, published by the Defense Mapping Agency Hydrographic/Topographic Center.

APPENDIX

Sales Information.-National Ocean Survey publications and nautical charts are sold by NOS and its authorized sales agents in many U.S. ports and in some foreign ports. Orders mailed should be addressed to National Ocean Survey, Distribution Division (OA/C44), 6501 Lafayette Avenue, Riverdale, Md. 20737, and accompanied by a check or money order payable to NOS, Department of Commerce. Remittance from outside the United States should be made either by an International Money Order or by a check payable on a U.S. bank. Chart catalogs, which include a listing of authorized sales agents, are free upon request. The National Ocean Survey maintains over-the-counter cash sales offices at 6501 Lafayette Avenue, Riverdale, Md. 20737; at 6001 Executive Boulevard, Room 101, Bldg. 1, Washington Science Center, Rockville, Md. 20852 (small orders only); at 439 West York Street, Norfolk, Va.; at 1801 Fairview Avenue East, Seattle, Wash.; and at 632 Sixth Avenue, Room 405, Anchorage, Alaska 99501.

National Ocean Survey Offices

Rockville (Headquarters): Director, National Ocean Survey, National Oceanic and Atmospheric Administration, 6001 Executive Boulevard, Rockville, Md 20852.

Norfolk: Director, Atlantic Marine Center, NOS, National Oceanic Atmospheric Administration, 439 West York Street, Norfolk, Va. 23510.

Seattle: Director, Pacific Marine Center, NOS, National Oceanic and Atmospheric Administration, 1801 Fairview Avenue East, Seattle, Wash. 98102.

Publications and Charts-National Ocean Survey

Nautical Charts (See Chart Catalogs)

United States Coastal and Intracoastal waters, and possessions.

Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River-St. Regis to Cornwall, Canada.

Publications (See Chart Catalogs for latest editions and prices)

Coast Pilots

U.S. Coast Pilot 1, Atlantic Coast, Eastport to Cape Cod.

U.S. Coast Pilot 2, Atlantic Coast, Cape Cod to Sandy Hook.

U.S. Coast Pilot 3, Atlantic Coast, Sandy Hook to Cape Henry.

U.S. Coast Pilot 4, Atlantic Coast, Cape Henry to Key West.

U.S. Coast Pilot 5, Atlantic Coast-Gulf of Mexico, Puerto Rico, and Virgin Islands.

U.S. Coast Pilot 6, Great Lakes, Lakes Ontario, Erie, Huron, Michigan and Superior, and St. Lawrence River.

U.S. Coast Pilot 7, Pacific Coast and Hawaii.

U.S. Coast Pilot 8, Pacific Coast, Alaska-Dixon Entrance to Cape Spencer.

U.S. Coast Pilot 9, Pacific and Arctic Coasts, Alaska-Cape Spencer to Beaufort Sea.

Distance Tables

Distances Between United States Ports, Sixth (1978) Edition.

Tide Tables

Europe and West Coast of Africa.

East Coast, North and South America.

West Coast, North and South America.

Central and Western Pacific Ocean and Indian Ocean.

Supplemental Tidal Predictions-Anchorage, Nikiski, Seldovia, and Valdez Alaska.

Tidal Current Tables

Atlantic Coast, North America.

Pacific Coast, North America and Asia.

Tidal Current Charts

Boston Harbor.

Narragansett Bay to Nantucket Sound.

Narragansett Bay.

Long Island Sound and Block Island Sound.

New York Harbor.

Delaware Bay and River.

Upper Chesapeake Bay.

Charleston Harbor, S.C., including the Wando, Cooper, and Ashley Rivers.

Tampa Bay.

San Francisco Bay.

Puget Sound, Northern Part.

Puget Sound, Southern Part.

Tidal Current Diagrams

Boston Harbor.

Long Island Sound and Block Island Sound.

New York Harbor.

Upper Chesapeake Bay.

Publications and Charts-Other U.S. Government Agencies

A partial list of publications and charts considered of navigational value is included for the ready reference of the mariner. In addition to the agents located in the principal seaports handling publication sales, certain libraries have been designated by the Congress of the United States to receive the publications as issued for public review.

Nautical Charts

U.S. Waters:

Apalachicola, Chattahoochee and Flint Rivers Navigation Charts, Alabama River Charts, and Black Warrior-Tombigbee Rivers River Charts: Published and for sale by U.S. Army Engineer District Mobile, P.O. Box 2288, 109 St. Joseph Sreet, Mobile, Ala. 36628.

Flood Control and Navigation Maps of the Mississippi River, Cairo, Ill. to the Gulf of Mexico: Published by Mississippi River Commission and for sale by U.S. Army Engineer District Vicksburg, P.O. Box 60, U.S. Post Office and Courthouse, Vicksburg, Miss. 39180.

Upper Mississippi River, Navigation Charts (Mississippi River, Cairo, Ill. to Minneapolis, Minn.): Published by U.S. Army Engineer North Central Division and for sale by U.S. Army Engineer District St. Louis, 210 N. Tucker Boulevard, St. Louis, Mo. 63101.

Charts of the Illinois Waterway, from Mississippi River at Grafton, Ill. to Lake Michigan at Chicago and Calumet Harbors: Published and for sale by U.S. Army Engineer District Rock Island, Clock Tower Bldg., Rock Island, Ill. 61201.

Foreign Waters: Published by Defense Mapping Agency Hydrographic/Topographic Center; for sale by Defense Mapping Agency Office of Distribution Services, Washington, D.C. 20315, and its sales agents.

Marine Weather Services Charts: Published by the National Weather Service; for sale by NOS Distribution Division (OA/C44), 6501 Lafayette Avenue, Riverdale, Md. 20737.

Publications

Sailing Directions (Foreign Countries): Published by Defense Mapping Agency Hydrographic/Topographic Center; for sale by Defense Mapping Agency Office of Distribution Services, Washington, D.C. 20315, and its sales agents.

Notice to Mariners may be obtained free from the following: Local Notices to Mariners–District Commander of the local Coast Guard district; Weekly Notice to Mariners, coasts of the United States, Possessions, and foreign–Defense Mapping Agency Office of Distribution Services; Local Notice to Mariners, Great Lakes–Commander, Ninth Coast Guard District, Cleveland, Ohio.

Special Notice to Mariners are published annually in Notice to Mariners 1. These notices contain important information of considerable interest to all mariners. Interested parties are advised to read these notices.

Light Lists (United States and Possessions): Published by U.S. Coast Guard; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Light Lists (Foreign Countries): Published by Defense Mapping Agency Hydrographic/Topographic Center; for sale by Defense Mapping Agency Office of Distribution Services, Washington, D.C. 20315, and its sales agents.

Radio Navigational Aids, Atlantic and Mediterranean Area (Pub. 117A), Pacific and Indian Oceans Area (Pub. 117B): Published by Defense Mapping Agency Hydrographic/Topographic Center; for sale by Defense Mapping Agency Office of Distribution Services, Washington, D.C. 20315, and its sales agents.

Worldwide Marine Weather Broadcasts: Published by the National Weather Service; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The **Nautical Almanac,** The **Air Almanac,** and **American Ephemeris and Nautical Almanac:** Published by U.S. Naval Observatory; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

American Practical Navigator (Bowditch) (Pub. No. 9), and **International Code of Signals** (Pub. No. 102): Published by the Defense Mapping Agency Hydrographic/Topographic Center; for sale by Defense Mapping Agency Office of Distribution Services, Washington, D.C. 20315, and its sales agents.

Rules of the Road; Navigation Rules, International-Inland (CG-169): Published by the U.S. Coast Guard; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Port Series of the United States: Published and sold by the Corps of Engineers, U.S. Army, Water Resources Support Center, Port Facilities Branch, Kingman Building, Fort Belvoir, Va. 22060.

Official U.S. **Coast Guard Recreational Boating Guide** (CG–340): Published by U.S. Coast Guard; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Marine Radio Telephony–How to correctly operate your radiotelephone set in the 2 MHz band; and Maritime Mobile VHF-FM Radio Telephony-Usage in the United States: Published by Radio Technical Commission for Marine Services; for sale by RTCM Services, c/o Federal Communications Commission, P.O. Box 19087, Washington, D.C. 20036.

Corps of Engineers Offices

Pacific Ocean Division Office: Bldg. 230, Fort Shafter, Hawaii 96858.

The Pacific Ocean Division includes the State of Hawaii. The division also performs protection and preservation works at the islands of Guam and American Samoa.

Los Angeles District Office: 300 North Los Angeles Street, Los Angeles, Calif. 90012.

The Los Angeles District includes the coastal waters and tributaries of California from the Mexican boundary to Cape San Martin (35°54′N., 121°27′W.).

Portland District Office: Multnomah Bldg., 319 S.W. Pine, Portland, Oreg. 97204.

The Portland District includes the coastal waters and tributaries of Oregon, and the waters and tributaries of the Columbia River as far as the bridge at Umatilla, Oreg., just below McNary Dam.

Sacramento District Office: 650 Capitol Mall, Federal and Court Bldg., Sacramento, Calif. 95814.

The Sacramento District includes Suisun Bay, and the Sacramento and San Joaquin Rivers and their tributaries.

San Francisco District Office: 211 Main Street, San Francisco, Calif. 94105.

The San Francisco District includes the coastal waters and tributaries from Cape San Martin to the Oregon boundary, including San Francisco Bay but not Suisun Bay and the Sacramento and San Joaquin Rivers and their tributaries.

Seattle District Office: 4735 East Marginal Way South, Seattle, Wash. 98134.

The Seattle District includes the coastal waters and tributaries of Washington except the Columbia River.

Walla Walla District Office: Bldg. 602, City-County Airport, Walla Walla, Wash., 99362.

The Walla Walla District includes the Columbia River and tributaries above the bridge at Umatilla, Oreg., just below McNary Dam.

Environmental Protection Agency (EPA) Offices.–Regional offices and States in the EPA coastal regions:

Region I (New Hampshire, Vermont, Maine, Massachusetts, Connecticut, Rhode Island): J. F. Kennedy Federal Bldg., Room 2203, Boston, Mass. 02203.

Region II (New Jersey, New York, Puerto Rico, Virgin Islands): 26 Federal Plaza, Room 900, New York, N.Y. 10278.

Region III (Delaware, Maryland, Virginia, District of Columbia, Pennsylvania): Curtis Bldg., Sixth and Walnut Streets, Philadelphia, Pa. 19106.

Region IV (Alabama, Florida, Georgia, Mississippi, South Carolina, North Carolina): 345 Courtland Street, NE., Atlanta, Ga. 30365.

Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin): 230 South Dearborn Street, Chicago, Ill. 60604.

Region VI (Louisiana, Texas): First International Bldg., 1201 Elm Street, Dallas, Tex. 75270.

Region IX (California, Hawaii, Guam): 215 Fremont Street, San Francisco, Calif. 94105.

Region X (Alaska, Oregon, Washington): 1200 Sixth Avenue, Seattle, Wash., 98101.

Coast Guard District Offices

Commander, Eleventh Coast Guard District, Union Bank Bldg., 400 Oceangate, Long Beach, Calif. 90822. The coastal waters and tributaries in California south of 34°58′N., and Lake Mead and Colorado River.

Commander Twelfth Coast Guard District, 630 Sansome Street, San Francisco, Calif. 94126. The coastal waters and tributaries in California north of 34°58′N.

Commander Thirteenth Coast Guard District, 915 Second Avenue, Seattle, Wash. 98174. The coastal waters and tributaries in Oregon, Washington, Idaho, and Montana.

Commander Fourteenth Coast Guard District, Prince Kalanianaole Federal Building, 300 Ala Moana Boulevard, Honolulu, Hawaii 96850. The State of Hawaii and the Pacific Islands belonging to the United States west of 150°W., and south of 40°N.

Note: Marine Safety Office includes Captain of the Port, Marine Inspection Office, and Documentation Office; (I) means Marine Inspection Office is at the same address; (D) means Documentation Office is at the same address.

Coast Guard Marine Safety Offices

Honolulu, Hawaii: 433 Ala Moana Boulevard, Room 1, 96813.

Los Angeles-Long Beach, Calif.: 165 North Pico Avenue 90802.

Portland, Oreg.: 6767 North Basin Avenue 97217.

San Diego, Calif.: 2710 Harbor Drive 92101.

San Francisco, Calif.: 1 Embarcadero Center 94111.

Coast Guard Captains of the Port

Humboldt Bay, Calif.: c/o U.S. Coast Guard Group, McKinleyville, Calif. 95521.

Monterey, Calif.: 100 Lighthouse Avenue 93940.

(I) (D) Seattle, Wash.: 1519 Alaskan Way, South 98134.

Coast Guard Documentation Offices

Bellingham, Wash.: 306 Federal Bldg. 98225.

Eureka, Calif.: Post Office Bldg., Room 201, 5th and H Streets 95501.

Port Angeles, Wash.: P.O. Box 990, 98362.

Tacoma, Wash.: 1102 Washington Bldg., 1019 Pacific Avenue 98402.

Coast Guard Stations.–The stations listed are in the area covered by this Coast Pilot. They have search and rescue capabilities and may provide lookout, communication, and/or patrol functions to assist vessels in distress. The National VHF-FM Distress System provides continuous coastal radio coverage outwards to 20 miles on 156.80 MHz (channel 16). After contact on channel 16, communications with the Coast Guard should be on 157.10 MHz (channel 22). If channel 22 is not available to the mariner, communications may be made on 156.60 MHz (channel 12). Selected stations guard the International Radiotelephone Distress, Safety and Calling Frequencies.

California:

Arcata Air Station (40°59′N., 124°06′W.). At McKinleyville.

Bodega Bay (38°18.7′N., 123°03.0′W.). On E side of channel 0.8 mile inside Bodega Harbor.

Channel Islands Harbor (34°09.7′N., 119°13.3′W.). On the E side of the harbor about 0.4 mile above the entrance.

Fort Point (37°48.3′N., 122°28.0′W.). On the Presidio, about 0.5 mile SE of Fort Point.

Humboldt Bay (40°46.1′N., 124°13.2′W.). E side of North Spit at the entrance to Humboldt Bay.

Lake Tahoe (39°10.8′N., 120°07.1′W.). On W shore of the lake, about 1.3 miles W of Dollar Point.

Los Angeles-Long Beach (33°45.8′N., 118°12.4′W.). At the N end of channel between Piers A and B in Long Beach Middle Harbor.

Los Angeles Air Station (33°57′N., 118°24′W.). At Los Angeles International Airport.

Mare Island (38°04.6′N., 122°14.8′W.). At SE end of Mare Island just NW of Pier 34.

Rio Vista (38°08.8′N., 121°41.5′W.). On the W side of the Sacramento River, 0.9 mile below bridge.

Sacramento Air Station (38°40'N., 121°24'W.). NE of the city at McClellan Air Force Base.

San Diego (32°43.6'N., 117°10.9'W.). In North San Diego Bay, 700 yards NE of E end of Harbor Island.

San Diego Air Station (32°44'N., 117°11'W.). At Lindbergh Field.

San Francisco (37°48.7'N., 122°21.6'W.). On the E side of Yerba Buena Island.

San Francisco Air Station (37°38'N., 122°23'W.). At San Francisco International Airport.

Hawaii:

Barbers Point Air Station (21°18.8'N., 128°04.4'W.). At Barbers Point Naval Air Station.

Honolulu Base (21°18.6'N., 157°52.6'W.). On Sand Island, 0.8 mile from harbor entrance.

Lihue (21°57.5'N., 159°21.4'W.). On the N side of the bay, just S of Nawiliwili.

Oregon:

Astoria Air Station (46°10'N., 123°53'W.). At Clatsop County Airport.

Chetco River (42°02.8'N., 124°16.0'W.). On E side of river, 500 yards above the entrance.

Coos Bay (43°20.7'N., 124°19.3'W.). S side of Charleston Boat Basin.

Depoe Bay (44°48.6'N., 124°03.5'W.). On E side of bay.

North Bend Air Station (43°25'N., 124°15'W.). At North Bend Municipal Airport.

Siuslaw River (44°00.1'N., 124°07.2'W.). On E side of river, 1 mile above the entrance.

Tillamook Bay (45°33.5'N., 123°55.2'W.). On N shore at Garibaldi.

Umpqua River (43°40.9'N., 124°10.9'W.). In Winchester Bay, 2 miles above the mouth.

Yaquina Bay (44°37.6'N., 124°03.3'W.). Newport waterfront, N side of bay near bridge.

Washington:

Bellingham (48°45.4'N., 122°30.4'W.). In Squalicum small-boat harbor.

Cape Disappointment (46°16.8'N., 124°02.7'W.). At Fort Canby on SW side of Baker Bay.

Grays Harbor (46°54.3'N., 124°06.1'W.). On the S side of Westhaven Cove.

Kennewick (46°13.0'N., 119°06.5'W.). On the S side of the Columbia River at E end of Clover Island.

Neah Bay (48°22.3'N., 124°35.8'W.). About 0.5 mile S of Waadah Island.

Port Angeles Air Station (48°08.4'N., 123°24.5'W.). On Ediz Hook about 0.3 mile W of the E extremity of the hook.

Quillayute River (47°54.5'N., 124°38.2'W.). At La Push.

Seattle (47°39.8'N., 122°23.5'W.). On S side Lake Washington Ship Canal, 0.8 mile from W entrance.

Willapa Bay (46°42.5'N., 123°58.0'W.) At the end of Toke Point.

Coast Guard Radio Broadcasts.–Urgent, safety, and scheduled marine information broadcasts are made by Coast Guard radio stations. In general, these broadcasts provide information vital to vessels operating in the approaches and coastal waters of the United States including Puerto Rico and U.S. Virgin Islands. Transmissions are as follows:

Urgent and safety broadcasts:

(1) By **radiotelegraph:** (a) Upon receipt, except within 10 minutes of the next silent period, for urgent messages only; (b) during the last 15 seconds of the first silent period after receipt: (c) repeated at the end of the first silent period which occurs during the working hours of one-operator ships unless the original warning has been cancelled or superseded by a later warning message.

(2) By **radiotelephone:** (a) upon receipt; (b) repeated 15 minutes later, for urgent messages only; (c) text only on the first scheduled broadcast unless canceled; (d) additional broadcasts at the discretion of the originator.

(3) Urgent broadcasts are preceded by the urgent signal; XXX for radiotelegraph; PAN for radiotelephone. Both the urgent signal and messages are transmitted on 500 kHz, 2182 kHz, and 156.80 MHz (channel 16). Safety broadcasts are preceded by the safety signal: TTT for radiotelegraph; SECURITY for radiotelephone. After the preliminary signal on 500 kHz and 2182 kHz, the station shifts to its assigned working medium frequency for the radiotelegraph broadcast and 2670 kHz for the radiotelephone transmission. Those stations broadcasting on VHF will announce on 156.80 MHz (channel 16), shifting to 157.10 MHz (channel 22).

Scheduled broadcasts.–The following Coast Guard radio stations make scheduled broadcasts, preceded by a preliminary call on 500 kHz, 2182 kHz and VHF-FM channel 16 (156.80 MHz), at the times and frequencies indicated.

Radiotelegraph:

Long Beach, Calif., 472 kHz, 0900 and 1900 P.s.t. (Antenna remotely keyed from NMC, San Francisco.)

NMC, San Francisco, Calif., 472 kHz, 0800 and 2100 P.s.t.

Astoria, Oreg., 472 kHz, 1030 and 2000 P.s.t. (Antenna remotely keyed from NMC, San Francisco.)

NMO, Honolulu, Hawaii, 440 kHz, 1100 and 1900 A.H.s.t.

Radiotelephone:

NOR, San Diego, Calif., VHF-FM channel 22 (157.10 MHz), 0900 and 1700 P.s.t.

NMQ–8, Channel Islands, Calif., 2670 kHz, 0503, 1303, and 2103 P.s.t.; VHF-FM channel 22 (157.10 MHz), 1000 and 1800 P.s.t.

NMC6, Monterey, Calif., 2670 kHz, 0733 and 1933 P.s.t.; VHF-FM channel 22 (157.10 MHz), 0815 and 1545 P.s.t.

NMC, San Francisco, Calif., 2670 kHz, 0603 and 1803 P.s.t.

NMC–17, San Francisco, Calif., VHF-FM channel 22 (157.10 MHz), 0830, 1100 and 1530 P.s.t.

NMC–11, Humboldt Bay, Calif., 2670 kHz, 0703 and 1903 P.s.t.; VHF-FM channel 22 (157.10 MHz), 0815 and 1515 P.s.t.

NOE, North Bend, Oreg., 2670 kHz, 1003 and 2203 P.s.t.; VHF-FM channel 22 (157.10 MHz), 1003 and 2203 P.s.t.

NMW, Astoria, Oregon, 2670 kHz, 0933 and 2133 P.s.t.; VHF-FM channel 22 (157.10 MHz), 0933 and 2133 P.s.t.

NMW-44, Portland, Oregon, VHF-FM channel 22 (157.10 MHz), 0945 P.s.t.

NOW, Port Angeles, Wash., 2670 kHz, 1015 and 2215 P.s.t.; VHF-FM channel 22 (157.10 MHz), 1015 and 2215 P.s.t.

NMW-43, Seattle, Wash., VHF-FM channel 22 (157.10 MHz), 1030 and 2230 P.s.t.

NMO, Honolulu, Hawaii, 2670 kHz, 0145, 0745, 1345, and 1945 A.H.s.t.; VHF-FM channel 22 (157.10 MHz), 0700 and 1900 A.H.s.t.

Customs Ports of Entry

Vessels may be entered and cleared at any port of entry or customs station, but at the latter only with advance authorization from the Customs Service district director.

Los Angeles Region:

San Diego District: San Diego.

Los Angeles District: Los Angeles-Long Beach, Port San Luis.

San Francisco Region:

San Francisco District: Eureka, San Francisco-Oakland.

Customs station: Monterey.

Portland District: Astoria, Coos Bay, Longview, Newport, Portland.

Seattle District: Aberdeen; Blaine; Puget Sound (includes Bellingham, Friday Harbor, Anacortes, Everett, Seattle, Tacoma, Olympia, Port Townsend, Port Angeles and Neah Bay); Point Roberts; South Bend-Raymond.

Honolulu District: Hilo, Honolulu, Kahului, Nawiliwili-Port Allen.

Foreign-Trade Zones

Foreign-Trade Zone No. 3 and Subzone 3-A, Pier 23, San Francisco, Calif. 94111.

Foreign-Trade Zone No. 5, P.O. Box 1209, Seattle, Wash. 98111.

Foreign-Trade Zone No. 9 and Subzone 9-A, Pier 39, Honolulu, Hawaii 96817.

Foreign-Trade Zone No. 45 and Subzone 45-A, P.O. BOx 3529, Portland, Oreg. 97208.

Foreign-Trade Zone No. 50, P.O. Box 570, Long Beach, Calif. 90801.

Foreign-Trade Zone No. 56, 1417 Clay Street, Oakland, Calif. 94612.

National Weather Service Offices.–The following offices will provide forecasts and climatological data or arrange to obtain these services from other offices. They will also check barometers in their offices or by telephone; refer to the local telephone directory for numbers:

Astoria, Oreg.: Clatsop Airport.

Auburn, Wash.: 3101 Auburn Way.

Bellingham, Wash.: Bellingham International Airport.

Eureka, Calif.: Federal Bldg.

Hilo, Hawaii: General Lyman Field.

Honolulu, Hawaii: Honolulu International Airport.

Kahului, Hawaii: Kahului Airport.

Lihue, Hawaii: Lihue Airport.

Long Beach, Calif.: Long Beach-Daugherty Airport.

Los Angeles, Calif.: 1102 Federal Bldg., 11000 Wilshire Boulevard; Los Angeles International Airport.

North Bend, Oreg.: North Bend Municipal Airport.

Oakland, Calif.: International Airport.

Olympia, Wash.: Olympia Airport.

Portland, Oreg.: 5420 Northeast Marine Drive; Customhouse.

Quillayute, Wash.: Quillayute Airport.

Sacramento, Calif.: 1416 Ninth Street; Executive Airport.

San Diego, Calif.: Lindbergh Field; Montgomery Field.

San Francisco, Calif.: 660 Price Avenue, Redwood City; San Francisco International Airport.

San Pedro, Calif.: U.S. Custom House, 300 South Ferry Street.

Santa Barbara, Calif.: Santa Barbara Municipal Airport.

Santa Maria, Calif.: Santa Maria Public Airport.

Seattle, Wash.: 1700 Westlake Avenue North; Seattle-Tacoma International Airport.

Stockton, Calif.: Stockton Metropolitan Airport.

The Dalles, Oreg.: The Dalles Municipal Airport.

Vandenberg, Calif.: Vandenberg Air Force Base.

Radio Weather Broadcasts.–Taped or direct broadcasts of marine weather forecasts and storm warnings are made by commercial and Coast Guard radio stations in the area covered by this Coast Pilot. These broadcasts usually are made several times a day; the transmission schedules are shown on the **Marine Weather Services Charts** for the following areas:

Mexican Border to Point Conception, Calif.

Point Conception, Calif. to Point St. George, Calif.

Point St. George, Calif. to Canadian Border.

Hawaiian Waters.

The weather broadcasts schedules of Coast Guard radio stations are also listed in the descriptions of Coast Guard marine services found elsewhere in this appendix.

NOAA Weather Radio.–National Weather Service VHF-FM radio stations provide mariners with continuous FM broadcasts of weather warnings, forecasts, radar reports, and surface weather observations. These stations usually transmit on 162.55 or 162.40 MHz. Reception range is up to 40 miles from the antenna site, depending on the terrain, type of receiver, and antenna used. The following VHF-FM radio stations with location of antenna are in or near the area covered by this Coast Pilot.

KEC-62, San Diego, Calif., (33°01'N., 116°58'W.), 162.40 MHz.

KWO-37, Los Angeles, Calif., (34°13'N., 118°04'W.), 162.55 MHz.

KIH-34, Santa Barbara, Calif., (34°32'N., 119°57'W.), 162.40 MHz.

KIH-31, San Luis Obispo, Calif., (35°21'N., 120°39'W.), 162.55 MHz.

KEC-49, Monterey, Calif., (37°10'N., 121°54'W.), 162.40 MHz.

KHB-49, San Francisco, Calif., (37°27'N., 122°20'W.), 162.55 MHz.

KEC-57, Sacramento, Calif., (38°20'N., 120°43'W.), 162.40 MHz.

KIH-30, Point Arena, Calif., (39°01'N., 123°31'W.), 162.40 MHz.

KEC-82, Eureka, Calif., (40°23'N., 124°13'W.), 162.40 MHz.

KIH-37, Brookings, Oreg., (42°08'N., 124°13'W.), 162.55 MHz.

KIH-32, Coos Bay, Oreg., (43°23'N., 124°08'W.), 162.40 MHz.

KEC-42, Eugene, Oreg., (44°00'N., 123°06'W.), 162.40 MHz.

KIH-33, Newport, Oreg., (44°45'N., 124°03'W.), 162.55 MHz.

KIG-98, Portland, Oreg., (45°34'N., 122°47'W.), 162.55 MHz.

WXL-95, Pendleton, Oreg., (45°35'N., 119°00'W.), 162.55 MHz.

KEC-91, Astoria, Oreg., (46°25'N., 123°47'W.), 162.40 MHz.

KIH-36, Neah Bay, Wash., (48°22'N., 124°40'W.), 162.55 MHz.

KHB-60, Seattle, Wash., (47°34'N., 122°48'W.), 162.55 MHz.

WXM-62, Olympia, Wash., (46°29'N., 123°13'W.), 162.475 MHz.

CFA-240, Victoria, Canada, (48°43'N., 123°29'W.), 162.40 MHz. (Canadian Government weather radio station.)

KBA-99, Hilo, Hawaii, (19°31'N., 155°18'W.), 162.55 MHz.

KBA-99, Maui, Hawaii, (20°43'N., 156°16'W.), 162.40 MHz.

KBA-99, Honolulu, Hawaii, (21°31'N., 158°09'W.), 162.55 MHz.

KBA-99, Kauai, Hawaii, (22°08'N., 159°40'W.), 162.40 MHz.

National Weather Service Forecast Offices (WSFO's).–Scheduled marine forecasts are issued four times daily by Weather Service Forecast Offices. (See National Weather Service, chapter 1, for further details.) Individual WSFO's and their specific areas of broadcast coverage are as follows:

Los Angeles, Calif.: Mexican border to Point Conception, out 60 miles, including waters surrounding Channel Islands, San Nicholas, Santa Barbara, Santa Catalina, and San Clemente Islands.

San Francisco, Calif.: (1) San Francisco, San Pablo, and Suisan Bays, and Western Delta Region; (2) Point Pinos to but not including Point Conception, out 60 miles; (3) Point Arena to but not including Point Pinos, out 60 miles; (4) Point St. George to but not including Point Arena, out 60 miles.

Portland, Oreg.: North Head to but not including Point St. George, out 60 miles.

Seattle, Wash.: Tatoosh Island to but not including North Head, out 60 miles; (2) Strait of Juan de Fuca; (3) Inland waters of western Washington.

Honolulu, Hawaii: Coastal waters of the islands of Kauai, Oahu, Maui, Lanai, Molokai, and Hawaii, out 100 miles.

National Weather Service Port Meteorological Officers (PMO's).–Port Meteorological Officers provide assistance on matters of weather chart interpretation, instruments, marine weather communications and requirements affecting ship operations. (See **National Weather Service,** chapter 1, for further details.) PMO offices in the area covered by this Coast Pilot are as follows:

Terminal Island, Calif: 2005 T Custom House, 300 South Ferry Street 90731.

Oakland, Calif: Metro Oakland International Airport 94614.

Seattle, Wash.: 7600 Sand Point Way, NE 98115.

Public Health Service Quarantine Stations.–Stations where quarantine examinations are performed:

Honolulu: U.S. Quarantine Station, Honolulu International Airport, P.O. Box 29300, Honolulu, Hawaii 96820.

Los Angeles: U.S. Quarantine Station, P.O. Box 90834, Los Angeles, Calif. 90009.

San Francisco: U.S. Quarantine Station, 1849 Old Bayshore Highway, Suite 220, Burlingame, Calif. 94010.

Seattle: U.S. Quarantine Station, Room S-212, Seattle-Tacoma Airport, Seattle, Wash. 98158.

At other ports, quarantine and/or medical examinations are usually performed by Public Health Service contract personnel or by quarantine inspectors from the nearest quarantine station. Inquiries concerning quarantine matters should be directed to the nearest quarantine station.

Food and Drug Administration (FDA) Regional Offices

Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont): 585 Commercial Street, Boston, Mass. 02109.

Region II (New Jersey, New York, Puerto Rico, Virgin Islands): 830 Third Avenue, Brooklyn, N.Y. 11232.

Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia): 2nd & Chestnut Streets, Room 900, Philadelphia, Pa. 19106.

Region IV (Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina): 1182 W. Peachtree Street, N.W., Atlanta, Ga. 30309.

Region VI (Louisiana, Texas): 3032 Bryan Street, Dallas, Tex. 75204.

Region IX (California, Hawaii): Federal Office Bldg., Room 568, 50 U.N. Plaza, San Francisco, Calif. 94102.

Region X (Alaska, Oregon, Washington): Federal Office Building, Room 5003, 909 First Avenue, Seattle, Wash. 98174.

Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) Offices.–Listed below are ports covered by this volume where APHIS inspectors are available to inspect plants, and plant and animal products, and locations of Animal Import Centers where livestock and birds are inspected.

Information on importation of plants, animals, and plant and animal products is available from APHIS, Department of Agriculture, Federal Building, 6505 Belcrest Road, Hyattsville, Md. 20782. The specific offices to contact are as follows: for plants, including fruits and vegetables, and plant products, Plant Protection and Quarantine, Regulatory Support Staff, Room 635, telephone 301-436-8247; for animal products, Plant Protection and Quarantine, Veterinary Medical Office, Room 664, telephone 301-436-7633; and for live ruminants, swine, equines, and poultry and other birds, Veterinary Services, Room 818, telephone 301-436-8170.

California:

Los Angeles: Bldg. D North, 9650 La Cienega Boulevard, Inglewood 90301.

San Diego: U.S. Border Station, San Ysidro 92073.

San Francisco: Room 101, Agriculture Bldg., Embarcadero and Mission Streets 94120.

Hawaii:

Hilo: General Lyman Field. 96720.

Honolulu: International Arrivals Bldg., Honolulu International Airport 96820.

Wailuku: Federal Post Office Bldg., Room 221, 96793.

Oregon:

Astoria: Port Docks 97103.

Coos Bay: U.S. Postal Service Bldg., 235 West Anderson Street 97420.

Portland: Federal Bldg., Room 657, 511 Northwest Broadway 97209.

Washington:

Blaine: U.S. Customs House, Room 216, 98230.

Seattle: Federal Office Bldg., Room 9014, 909 First Avenue 98174.

Animal Import Centers:

Honolulu, Hawaii: P.O. Box 50001, 96850.

Miami, Fla.: P.O. Box 523054, 33152.

Rock Tavern, N.Y., New York Animal Import Center, Stewart Airport, Rural Route 1, Box 74, 12575.

Immigration and Naturalization Service Offices

California:

Los Angeles: 300 North Los Angeles Street 90012.

Sacramento: Federal and U.S. Courthouse Bldg., Room 1-060, 650 Capitol Mall 95814.

San Diego: 880 Front Street 92188.

San Francisco: Appraisers Bldg., 630 Sansome Street 94111.

San Luis Obispo: Frontage Road South Highway 101, 93406.

San Pedro: Terminal Island 90731.

Stockton: U. S. Post Office Bldg., Room 202, 401 North San Joaquin Street 95202.

Hawaii:

Honolulu: 595 Ala Moana Boulevard 96809.

Oregon:

Portland: Federal Office Bldg., 511 Northwest Broadway 97209.

Washington:

Bellingham: Federal Bldg., Magnolia and Cornwall Streets 98227.

Blaine: Peace Arch Inspection Station 98230.

Longview: U.S. Postal Service Bldg., Room 211, 1603 Larch Street 98632.

Port Angeles: U.S. Post Office Bldg., First and Oak Streets 98362.

Seattle: 815 Airport Way South 98134.

Tacoma: U.S. Post Office Bldg., Room 220, 11th and A Streets 98401.

Federal Communications Commission Offices

District field offices:

Honolulu, Hawaii: Prince Kuhio Federal Bldg., Room 7304, 300 Ala Moana Boulevard 96850.

Long Beach, Calif.: 3711 Long Beach Boulevard, Room 501, 90807.

Portland, Oreg.: 1782 Federal Office Bldg., 1220 S.W. 3rd Avenue 97204.

San Diego/La Mesa, Calif., 7840 El Cajon Blvd., Room 405, 92041.

San Francisco, Calif., 423 Customhouse, 555 Battery Street 94111.

Seattle, Wash.: 3256 Federal Bldg., 915 Second Avenue 98174.

Radio shore stations providing medical advice.–Messages to shore stations may be transmitted in code groups or plain language; messages should be signed by the master and be prefixed: "DH MEDICO". The following stations maintain a continuous guard on 500 kHz. (See Medical advice, chapter 1.)

KOK, Los Angeles, Calif., ITT World Communications, Inc.

NMC, San Francisco, Calif., U.S. Coast Guard

KFS, San Francisco, Calif., ITT World Communications, Inc.

KPH, San Francisco, Calif., RCA Global Communications, Inc.

KLB, Seattle, Wash., ITT World Communications, Inc.

NMO, Honolulu, Hawaii, U.S. Coast Guard.

Measured Courses.–The positions of measured courses are shown on the chart and their description is included in the Coast Pilots when information is reported to the National Ocean Survey. Courses are located in the following places covered by this Coast Pilot.

Barbers Point, on the S coast of the Island of Oahu; 19362.

Bellingham Bay, off the entrance to Whatcom Creek Waterway; 18424.

Budd Inlet, SE of Olympic Shoal; 18456.

Carr Inlet, on the NE shore of McNeil Island; 18448.

Channel Islands Harbor, on the breakwater N of the entrance; 18725.

Commencement Bay, on the W shore of the bay; 18453.

Del Mar Boat Basin, 1.6 miles NW of basin entrance; 18740.

Dungeness Bay, on the strait side of Dungeness Spit; 18465.

Kaneohe Bay, SE of Moku o Loe Island in S part of bay; 19359.

Lake Washington, on pontoon bridge from Foster Island to Evergreen Point; 18447.

Lake Washington, on pontoon bridge to Mercer Island; 18447.

Long Beach Harbor, on Long Beach Breakwater; 18751.

Marina del Rey, just N of entrance; 18744.

Newport Harbor, W side of harbor entrance; 18754.

Oakland Harbor, on N side Inner Harbor Channel; 18650.

Pacific Beach, just N of Scripps Institution of Oceanography; 18765.

Parry Bay, on the NW shore of the bay; 18465.

Port Angeles, in SW part of the harbor; 18468.

Portland Harbor, in Willamette River SE of Doane Point; 18526.

Portland Harbor, in Willamette River W of Swan Island; 18526.

Port Townsend, on boat harbor breakwater; 18464.

Sacramento River, on NE side of river N of Walnut Grove; 18662.

San Clemente Island, S of West Cove; 18763.

San Diego Bay, on W side of North Island; 18773.

Santa Barbara Harbor, E of Stearns Wharf; 18725.

Sinclair Inlet, S of Bremerton naval shipyard; 18452.

Threemile Slough, on the W bank of the slough about 0.5 mile N of S entrance; 18661.

Vancouver Harbor, at Lieser Point; 18531.

Vashon Island, E of Point Beals; 18448.

The pages in the text describing the courses can be obtained by referring to the index for the geographic places; the chart number follows the names.

CLIMATOLOGICAL TABLES

These tables were prepared by the Environmental Data Service. Station level pressure refers to the actual pressure taken at the elevation of the station. Where it has been reduced to sea level, the term sea level pressure is used. Time given is local standard time.

* means less than 0.5 percent.
* means less than 0.5 day.
* means trace (not measurable) of precipitation.

SAN DIEGO, CALIFORNIA (32°44'N., 117°10'W.) Elevation 13 ft. (4.0m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1016.7	1017.9	1016.7	1015.8	1014.7	1013.1	1013.2	1012.9	1011.9	1014.2	1016.9	1018.0	1015.3	28
TEMPERATURE (DEGREES F)														
MEAN	55.2	56.7	58.1	60.7	63.3	65.5	69.6	71.4	69.9	66.1	60.8	56.7	62.9	30
MEAN DAILY MAXIMUM	64.6	65.6	66.0	67.6	69.4	71.1	75.3	77.3	76.5	73.8	70.1	66.1	70.3	30
MEAN DAILY MINIMUM	45.8	47.8	50.1	53.8	57.2	59.9	63.9	65.4	63.2	58.4	51.5	47.2	55.4	30
EXTREME HIGHEST	86	85	88	91	91	90	92	90	111	107	97	88	111	15
EXTREME LOWEST	31	38	39	44	48	51	57	58	56	43	38	36	31	15
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	54	56	59	58	64	69	69	67	65	58	57	53	61	15
AVERAGE PERCENTAGE (1600L)	55	57	59	58	63	67	66	66	64	61	63	57	61	15
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	4.9	5.0	5.2	5.2	5.7	5.6	4.5	4.1	4.0	4.3	4.1	4.7	4.8	35
MEAN NUMBER OF DAYS WITH CLEAR SKIES	13	11	11	10	9	9	13	15	16	15	15	14	151	35
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	11	10	10	10	11	9	5	4	5	7	7	9	98	35
PRECIPITATION														
MEAN AMOUNT (INCHES)	1.88	1.48	1.55	0.81	0.15	0.05	0.01	0.07	0.13	0.34	1.25	1.73	9.45	30
GREATEST AMOUNT (INCHES)	6.26	5.31	5.89	3.58	0.95	0.38	0.13	0.87	1.90	2.90	5.82	7.00	24.93	35
LEAST AMOUNT (INCHES)	*	0.00	*	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	3.41	35
MAXIMUM IN 24 HRS. (INCHES)	2.65	1.71	2.40	1.40	0.42	0.28	0.10	0.83	0.70	1.20	2.44	3.07	3.07	35
MEAN AMOUNT OF SNOW (INCHES)	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	35
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	35
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	0	0	0	0	0	0	0	0	0	0	0	0	0	35
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	6	6	7	5	2	1	*	*	1	2	5	6	41	35
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	2.8	3.0	3.6	4.2	4.4	4.5	3.7	3.5	3.4	2.8	2.6	2.7		20
MEAN WIND SPEED (KNOTS) (1300L)	7.4	8.5	9.6	10.3	10.1	9.6	9.0	9.2	9.5	9.0	8.2	7.4		20
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	7.0	7.8	6.6	6.9	6.0	6.7	9.4	9.6	14.8	11.0	8.8	8.2		20
NORTH NORTHEAST	3.7	3.5	2.9	2.7	2.1	2.7	3.4	3.9	4.8	4.5	3.9	4.1		20
NORTHEAST	2.6	2.9	2.4	1.6	1.1	0.9	1.0	1.3	1.5	3.0	2.9	3.1		20
EAST NORTHEAST	2.1	2.0	1.6	1.2	0.5	0.7	0.5	0.2	0.7	1.4	1.7	2.4		20
EAST	10.3	8.8	8.0	3.9	1.3	0.8	0.4	0.8	1.5	4.2	8.4	9.8		20
EAST SOUTHEAST	11.5	9.3	8.7	4.9	2.4	1.1	0.2	0.9	1.8	5.1	8.3	9.0		20
SOUTHEAST	8.6	8.8	10.3	6.8	4.3	3.4	1.5	2.2	3.1	8.0	8.2	9.2		20
SOUTH SOUTHEAST	3.8	4.5	9.8	7.8	7.7	6.3	4.4	4.5	4.7	5.0	4.3	3.3		20
SOUTH	3.0	3.5	4.3	8.4	12.0	14.9	10.2	9.9	7.3	4.7	3.3	2.3		20
SOUTH SOUTHWEST	1.4	1.3	2.2	3.9	8.9	9.4	9.1	6.2	4.3	2.0	1.3	1.0		20
SOUTHWEST	1.2	1.1	2.8	4.7	7.6	9.0	6.4	4.6	3.6	2.6	1.3	1.4		20
WEST SOUTHWEST	1.0	1.5	1.8	3.2	5.3	4.3	2.9	3.4	2.5	1.5	0.9	1.3		20
WEST	2.2	3.5	4.5	7.7	9.8	6.4	6.3	6.5	4.9	2.8	2.6	2.3		20
WEST NORTHWEST	2.0	2.8	3.8	6.4	6.8	5.8	7.6	7.4	5.1	3.3	2.5	1.5		20
NORTHWEST	3.2	3.4	4.8	6.5	6.9	9.7	14.9	12.6	9.7	5.4	3.0	2.0		20
NORTH NORTHWEST	2.8	2.1	3.0	5.0	5.0	6.7	9.7	10.2	12.0	6.5	3.3	2.4		20
CALM	33.5	33.1	20.5	18.5	12.1	10.9	13.0	15.7	17.5	29.0	35.2	35.8		20
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	3.0	1.5	0.8	0.2	0.3	0.2	0.4	0.4	0.8	1.1	1.9	3.7		20
NORTH NORTHEAST	0.5	0.2	0.1	0.2	0.1	0.0	0.2	0.0	0.1	0.2	0.2	0.6		20
NORTHEAST	0.6	0.1	0.1	*	0.0	0.0	0.1	0.0	*	0.3	0.2	0.7		20
EAST NORTHEAST	0.2	0.1	0.1	*	0.1	0.0	0.0	0.0	0.0	0.1	0.4	0.5		20
EAST	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.4		20
EAST SOUTHEAST	0.4	0.1	0.1	*	0.1	0.0	0.0	0.0	0.0	0.2	0.3	0.6		20
SOUTHEAST	1.2	0.4	0.2	*	0.1	0.0	0.2	*	*	0.2	0.6	1.2		20
SOUTH SOUTHEAST	3.3	1.9	1.6	0.9	0.4	0.2	0.1	0.2	0.6	0.6	2.2	2.1		20
SOUTH	8.6	8.1	6.4	5.1	4.5	5.2	3.5	3.0	4.0	4.1	7.1	7.5		20
SOUTH SOUTHWEST	8.1	6.6	7.9	9.2	10.6	14.0	12.9	9.6	7.2	6.5	6.9	6.9		20
SOUTHWEST	6.3	7.1	8.1	8.5	10.4	13.0	8.7	8.5	7.0	6.6	6.1	6.9		20
WEST SOUTHWEST	4.2	4.1	7.8	8.1	10.6	8.9	6.7	6.7	4.4	5.5	4.1	3.7		20
WEST	12.0	13.8	20.9	21.7	25.0	22.5	20.1	21.9	15.6	16.8	13.0	11.7		20
WEST NORTHWEST	16.1	18.9	22.0	24.9	20.9	22.1	25.1	27.9	20.5	22.3	19.2	13.2		20
NORTHWEST	24.2	20.9	19.2	18.3	14.0	12.5	19.4	19.2	27.9	20.3	20.0	25.3		20
NORTH NORTHWEST	8.5	7.0	4.4	2.8	2.3	1.5	2.6	2.6	5.4	8.7	8.2	11.9		20
CALM	2.3	1.1	0.2	*	*	*	0.1	*	0.2	0.3	1.1	3.2		20
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	4	3	2	1	1	1	1	1	3	4	4	4	29	35

LOS ANGELES, CALIFORNIA (33°56'N., 118°24'W.) Elevation 97 ft. (29.6m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1019.0	1018.3	1016.6	1015.6	1014.5	1013.0	1013.3	1013.6	1012.3	1014.5	1017.3	1018.7	1015.6	17
TEMPERATURE (DEGREES F)														
MEAN	54.5	55.6	56.5	58.8	61.9	64.5	68.5	69.5	68.7	65.2	60.5	56.9	61.7	30
MEAN DAILY MAXIMUM	63.5	64.1	64.3	65.9	68.4	70.3	74.8	75.8	75.7	72.9	69.6	66.5	69.2	30
MEAN DAILY MINIMUM	45.4	47.0	48.6	51.7	55.3	58.6	62.1	63.2	61.6	57.5	51.3	47.3	54.1	30
EXTREME HIGHEST	87	92	88	95	96	92	92	91	110	106	101	88	110	17
EXTREME LOWEST	30	37	39	43	45	50	55	58	55	43	38	32	30	17
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	54	58	61	60	65	70	68	68	65	58	58	55	62	16
AVERAGE PERCENTAGE (1600L)	59	62	66	63	66	69	68	69	67	64	64	61	65	16
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	5.2	5.0	5.1	4.8	5.2	5.2	4.0	3.9	4.1	4.4	4.6	4.7	4.7	27
MEAN NUMBER OF DAYS WITH CLEAR SKIES	12	12	11	11	10	9	12	13	13	13	14	13	143	40
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	11	10	11	10	10	10	6	6	6	8	8	10	106	40
PRECIPITATION														
MEAN AMOUNT (INCHES)	2.52	2.32	1.71	1.10	0.08	0.03	0.01	0.02	0.07	0.22	1.76	2.39	11.59	30
GREATEST AMOUNT (INCHES)	9.60	11.07	5.98	4.52	0.56	0.29	0.15	0.30	4.39	2.34	7.92	6.57	23.91	40
LEAST AMOUNT (INCHES)	0.00	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*	3.12	40
MAXIMUM IN 24 HRS. (INCHES)	6.19	4.16	3.54	1.88	0.56	0.29	0.15	0.21	4.20	1.77	5.60	3.01	6.19	40
MEAN AMOUNT OF SNOW (INCHES)	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	40
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	40
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	0	0	0	0	0	0	0	0	0	0	0	0	0	40
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	6	6	5	3	1	1	1	*	1	2	4	5	35	40
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	4.5	4.5	4.5	4.5	4.3	3.8	3.3	3.1	3.0	3.4	4.2	4.3		19
MEAN WIND SPEED (KNOTS) (1300L)	7.3	8.8	10.3	10.6	10.8	10.2	9.9	10.0	9.9	9.3	8.1	7.2		19
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	5.6	5.3	4.2	2.9	1.2	1.1	2.3	2.3	2.8	4.1	4.9	6.6		19
NORTH NORTHEAST	8.0	7.5	4.5	1.9	1.8	1.1	1.0	1.3	2.1	3.3	7.1	9.1		19
NORTHEAST	17.2	12.0	9.2	5.1	3.5	2.4	2.3	2.6	4.0	8.9	15.1	15.1		19
EAST NORTHEAST	16.6	14.8	14.7	9.5	7.5	5.1	4.1	4.9	6.3	10.2	15.2	14.6		19
EAST	15.8	14.0	16.4	15.6	13.1	11.3	7.9	9.1	10.4	14.3	14.8	14.3		19
EAST SOUTHEAST	6.7	7.7	11.7	10.7	11.7	11.2	9.2	7.3	7.8	7.8	8.8	8.2		19
SOUTHEAST	4.6	5.0	7.2	10.4	10.9	11.8	11.8	9.7	7.7	5.4	5.5	5.4		19
SOUTH SOUTHEAST	2.1	2.4	2.7	4.0	6.0	9.1	6.5	6.2	4.1	2.8	2.2	2.3		19
SOUTH	0.8	1.2	1.2	2.9	4.2	5.3	4.9	5.4	4.4	2.8	1.4	1.0		19
SOUTH SOUTHWEST	0.8	1.0	1.1	2.0	3.2	3.3	3.9	3.9	2.6	1.8	0.9	0.5		19
SOUTHWEST	0.8	0.9	1.3	3.8	4.5	5.0	5.5	4.6	2.3	2.0	1.2	0.7		19
WEST SOUTHWEST	1.3	1.9	1.3	5.0	6.3	7.0	6.6	6.3	5.2	2.6	1.1	1.0		19
WEST	1.5	2.3	3.3	6.2	8.3	6.9	6.7	8.8	5.6	4.5	1.4	1.3		19
WEST NORTHWEST	0.8	2.9	3.0	3.5	4.3	3.4	3.9	3.4	4.3	3.0	2.0	1.6		19
NORTHWEST	2.4	1.7	1.8	2.0	1.5	1.3	2.3	2.7	3.6	3.1	2.3	2.0		19
NORTH NORTHWEST	3.6	4.8	3.3	3.3	1.6	0.6	1.9	2.3	2.5	3.3	2.3	3.2		19
CALM	11.4	14.7	12.9	11.3	10.4	14.1	17.2	19.3	24.3	20.0	14.0	13.2		19
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	2.6	1.2	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.1	1.7		19
NORTH NORTHEAST	1.2	1.2	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.4	0.7	1.7		19
NORTHEAST	2.1	0.7	0.5	0.4	0.0	0.1	0.0	0.1	0.0	0.2	1.4	1.9		19
EAST NORTHEAST	3.6	1.2	0.4	0.2	0.0	0.0	0.0	0.1	0.2	0.2	1.7	2.9		19
EAST	4.1	2.1	0.4	0.2	0.0	0.0	0.0	0.1	0.1	0.5	1.5	2.4		19
EAST SOUTHEAST	3.6	3.2	1.0	0.7	0.2	0.2	0.1	0.2	0.2	0.2	2.7	4.3		19
SOUTHEAST	5.2	2.9	2.1	1.2	0.4	0.4	0.2	0.2	0.2	1.2	3.1	4.4		19
SOUTH SOUTHEAST	3.8	2.3	1.6	1.1	0.5	0.7	0.1	0.2	0.4	0.5	2.2	3.7		19
SOUTH	3.6	2.3	0.9	0.7	0.3	0.4	0.1	0.0	0.2	0.2	1.9	2.6		19
SOUTH SOUTHWEST	6.7	5.8	4.3	1.7	1.0	0.7	0.2	0.2	0.6	2.1	2.9	4.5		19
SOUTHWEST	9.9	11.9	14.4	11.0	11.7	11.9	9.5	7.0	8.3	10.5	8.3	8.3		19
WEST SOUTHWEST	33.2	32.7	43.2	45.5	51.1	54.6	53.0	52.0	50.1	42.9	33.0	24.2		19
WEST	19.7	25.3	25.7	32.0	30.1	28.3	33.0	35.5	34.6	35.4	30.0	26.6		19
WEST NORTHWEST	4.9	3.8	3.2	4.3	4.2	2.4	3.8	4.2	4.4	4.5	5.6	4.8		19
NORTHWEST	2.4	1.3	0.5	0.2	0.1	0.2	0.0	0.2	0.4	0.3	0.8	0.8		19
NORTH NORTHWEST	1.3	1.4	0.9	0.4	0.0	0.0	0.0	0.0	0.1	0.2	1.7	2.5		19
CALM	2.1	0.8	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.6	1.4	2.7		19
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	5	4	4	3	2	2	2	3	4	5	6	6	44	43

SAN FRANCISCO, CALIFORNIA (37°37'N., 122°23'W.) Elevation 8 ft. (2.4m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1020.5	1019.8	1018.3	1017.3	1016.2	1014.6	1014.5	1014.9	1013.9	1016.4	1019.4	1020.9	1017.2	13
TEMPERATURE (DEGREES F)														
MEAN	48.3	51.2	53.0	55.3	58.3	61.6	62.5	63.0	64.1	61.0	55.3	49.7	56.9	30
MEAN DAILY MAXIMUM	55.3	58.6	61.0	63.5	66.6	70.2	70.9	71.6	73.6	70.3	63.3	56.5	65.1	30
MEAN DAILY MINIMUM	41.2	43.8	44.9	47.0	49.9	53.0	54.0	54.3	54.5	51.6	47.2	42.9	48.7	30
EXTREME HIGHEST	71	72	79	85	94	106	98	98	103	98	85	72	106	16
EXTREME LOWEST	29	33	31	38	40	43	48	49	45	39	33	24	24	16
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	79	75	70	65	65	65	66	67	68	68	76	78	70	16
AVERAGE PERCENTAGE (1600L)	67	65	63	60	61	60	61	62	59	59	65	69	62	16
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	6.2	6.0	5.6	5.0	4.5	3.8	3.0	3.2	3.1	4.0	5.4	6.1	4.7	34
MEAN NUMBER OF DAYS WITH CLEAR SKIES	9	8	10	11	14	16	21	19	19	16	12	9	164	48
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	14	13	12	9	8	5	3	3	3	6	10	14	100	48
PRECIPITATION														
MEAN AMOUNT (INCHES)	4.37	3.04	2.54	1.59	0.41	0.13	0.01	0.03	0.16	0.98	2.29	3.98	19.53	30
GREATEST AMOUNT (INCHES)	10.43	9.52	9.01	6.36	3.31	0.86	0.23	0.29	2.30	7.30	7.96	12.30	32.91	40-48
LEAST AMOUNT (INCHES)	0.31	*	*	*	*	0.00	0.00	*	*	*	0.00	0.21	9.20	40-48
MAXIMUM IN 24 HRS. (INCHES)	4.58	2.31	2.11	2.66	1.54	0.83	0.23	0.29	2.30	3.74	2.39	3.33	4.58	48
MEAN AMOUNT OF SNOW (INCHES)	*	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	48
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	1.5	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.5	48
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	*	0	0	0	0	0	0	0	0	0	0	*	*	48
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	11	10	9	6	3	1	*	*	1	4	7	10	62	48
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	5.6	5.8	6.5	7.0	7.9	8.3	7.1	6.3	5.8	5.2	4.6	5.6		17
MEAN WIND SPEED (KNOTS) (1300L)	8.4	10.0	12.3	14.7	15.9	16.5	16.3	15.7	14.1	11.6	8.5	8.0		17
DIRECTION (PERCENTAGE OF OBS.)1 AT 0700L														
NORTH	2.3	3.1	2.4	1.0	1.4	1.3	1.5	1.4	1.4	1.6	2.5	1.9		17
NORTH NORTHEAST	2.5	2.3	1.9	0.8	0.6	1.5	1.3	0.8	1.0	1.1	0.9	3.2		17
NORTHEAST	3.4	1.8	1.2	1.9	2.6	2.6	2.7	1.7	1.5	0.8	1.3	3.6		17
EAST NORTHEAST	3.0	2.0	1.0	1.0	2.0	2.8	1.8	0.8	0.7	1.4	1.6	3.7		17
EAST	4.5	3.3	1.4	2.2	1.9	1.7	1.3	1.5	1.3	1.4	2.3	5.0		17
EAST SOUTHEAST	6.2	3.5	3.3	3.3	2.2	1.5	1.2	1.1	1.5	2.2	5.5	6.3		17
SOUTHEAST	12.0	10.0	6.5	5.0	2.8	1.9	1.2	1.5	3.3	5.1	11.8	10.6		17
SOUTH SOUTHEAST	9.1	6.9	6.8	4.0	2.8	1.3	0.6	1.6	3.2	6.0	6.0	9.5		17
SOUTH	7.5	6.7	5.7	4.6	4.2	2.9	1.4	2.3	3.4	6.8	6.5	9.2		17
SOUTH SOUTHWEST	6.2	5.2	3.2	4.7	3.2	3.1	1.6	2.0	2.7	4.2	5.8	5.3		17
SOUTHWEST	5.2	6.2	3.9	4.6	3.3	4.1	2.9	3.5	5.0	5.4	6.7	5.0		17
WEST SOUTHWEST	3.9	5.4	6.0	7.0	8.9	10.6	8.1	8.7	7.3	4.7	3.4	3.4		17
WEST	4.1	8.8	10.7	14.8	20.4	22.1	17.0	17.1	15.1	10.9	5.9	4.4		17
WEST NORTHWEST	6.2	10.0	17.3	21.7	22.8	23.5	22.9	23.0	21.9	17.6	7.7	5.6		17
NORTHWEST	3.5	5.6	7.1	9.8	10.3	9.9	19.6	16.4	13.6	8.6	5.0	3.7		17
NORTH NORTHWEST	1.1	2.1	1.8	1.3	1.6	1.8	3.6	3.4	3.0	1.5	1.2	1.7		17
CALM	19.4	17.3	15.8	12.3	9.1	7.4	11.7	13.2	14.1	22.3	25.7	17.8		17
DIRECTION (PERCENTAGE OF OBS.)1 AT 1300L														
NORTH	3.2	3.2	2.7	1.3	0.3	0.4	1.1	1.0	1.8	3.2	4.1	2.6		17
NORTH NORTHEAST	7.6	6.4	4.0	1.8	0.9	1.1	1.3	1.8	3.7	5.2	6.3	5.0		17
NORTHEAST	13.6	12.5	7.1	2.2	2.3	1.9	2.2	2.5	5.0	10.8	16.1	13.9		17
EAST NORTHEAST	11.6	8.0	6.0	2.4	1.1	1.2	0.8	1.5	2.1	4.9	9.9	13.5		17
EAST	11.6	9.0	4.9	1.0	0.4	0.1	0.4	0.4	1.0	2.7	7.3	11.2		17
EAST SOUTHEAST	8.6	4.7	2.4	0.4	0.4	0.2	0.2	0.2	0.5	0.9	5.0	8.9		17
SOUTHEAST	8.0	5.8	2.9	1.5	0.2	0.3	0.1	0.5	0.4	1.2	5.3	9.5		17
SOUTH SOUTHEAST	3.8	2.6	1.6	1.7	0.3	0.2	0.0	0.3	0.3	1.5	2.7	2.9		17
SOUTH	4.7	4.2	3.7	2.1	1.4	0.6	0.1	0.6	0.8	2.4	2.5	4.3		17
SOUTH SOUTHWEST	4.9	4.6	4.0	4.2	3.6	2.6	0.9	1.5	1.4	2.8	3.2	2.7		17
SOUTHWEST	2.9	3.5	3.9	4.8	5.8	4.4	2.6	2.1	3.0	2.7	4.1	2.3		17
WEST SOUTHWEST	2.4	3.3	5.0	8.1	6.8	9.7	4.8	4.4	4.6	3.5	2.7	2.9		17
WEST	5.7	9.0	14.9	21.6	27.1	25.1	14.0	17.1	14.8	12.5	3.3	4.4		17
WEST NORTHWEST	5.1	14.1	24.5	28.7	33.0	32.1	29.7	29.2	28.4	24.3	11.8	6.3		17
NORTHWEST	1.7	5.1	10.0	16.9	15.0	18.9	35.5	32.1	27.8	17.8	6.8	3.9		17
NORTH NORTHWEST	1.2	1.4	1.6	1.0	1.2	1.1	6.1	4.8	4.0	2.3	1.6	1.0		17
CALM	3.4	2.7	0.7	0.3	0.1	0.3	0.2	0.2	0.3	1.5	3.1	4.6		17
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	4	3	*	*	*	*	*	*	1	2	3	4	17	38

[redacted]

SACRAMENTO, CALIFORNIA (38°31'N., 121°30'W.) Elevation 17 ft. (5.2m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1020.6	1019.0	1017.5	1015.9	1014.1	1012.1	1012.0	1012.1	1012.0	1015.4	1018.8	1020.2	1015.8	33
TEMPERATURE (DEGREES F)														
MEAN	45.1	49.8	53.0	58.3	64.2	70.5	75.2	74.1	71.5	63.3	53.0	45.8	60.3	30
MEAN DAILY MAXIMUM	53.0	59.1	64.1	71.3	78.8	86.4	92.9	91.3	87.7	77.1	63.6	53.3	73.2	30
MEAN DAILY MINIMUM	37.1	40.6	41.9	45.3	49.8	54.6	57.5	56.9	55.2	49.5	42.4	38.3	47.4	30
EXTREME HIGHEST	69	76	86	92	102	115	114	108	108	101	87	72	113	25
EXTREME LOWEST	23	26	26	32	36	41	49	49	43	36	26	20	20	25
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	86	79	68	58	52	48	48	49	50	58	77	86	63	13
AVERAGE PERCENTAGE (1600L)	71	61	52	43	37	32	28	28	31	40	61	73	46	13
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	7.1	6.2	5.3	4.6	3.6	2.2	1.0	1.4	1.6	3.3	5.7	6.9	4.1	27
MEAN NUMBER OF DAYS WITH CLEAR SKIES	6	8	11	13	17	22	27	26	24	19	10	7	190	27
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	19	14	12	8	5	3	1	1	2	6	13	18	102	27
PRECIPITATION														
MEAN AMOUNT (INCHES)	3.73	2.68	2.17	1.54	0.51	0.10	0.01	0.05	0.19	0.99	2.13	3.12	17.22	30
GREATEST AMOUNT (INCHES)	8.50	6.77	5.62	4.76	3.13	0.53	0.79	0.65	1.61	7.31	7.41	12.04	28.47	30
LEAST AMOUNT (INCHES)	0.38	0.15	0.14	0.00	*	0.00	0.00	0.00	0.00	0.00	0.02	0.17	7.99	30
MAXIMUM IN 24 HRS. (INCHES)	3.41	2.51	2.07	2.22	0.78	0.63	0.79	0.65	1.56	3.39	2.95	3.04	3.39	27
MEAN AMOUNT OF SNOW (INCHES)	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	27
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	27
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	0	0	0	0	0	0	0	0	0	0	0	0	0	27
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	10	9	8	6	3	1	*	*	1	3	7	10	58	36
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	5.3	5.3	5.8	6.0	6.7	7.2	6.8	6.2	5.2	4.6	4.5	5.2		33
MEAN WIND SPEED (KNOTS) (1300L)	7.3	7.8	8.2	7.9	7.7	7.5	6.2	5.7	5.9	6.4	6.5	6.7		33
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	10.9	11.5	9.1	7.0	5.4	3.8	1.6	1.4	7.0	9.4	9.3	11.1		33
NORTH NORTHEAST	2.0	2.6	2.3	1.8	1.0	0.7	0.5	0.6	1.7	2.5	2.7	2.9		33
NORTHEAST	2.9	2.5	1.8	1.5	0.9	0.8	0.8	0.7	1.5	2.9	3.9	3.3		33
EAST NORTHEAST	1.2	1.1	1.0	0.7	0.8	0.6	0.1	0.4	0.5	0.8	1.4	1.2		33
EAST	3.5	3.5	3.1	2.6	1.8	1.5	1.4	1.8	2.8	2.9	3.3	3.6		33
EAST SOUTHEAST	2.7	4.3	6.3	4.4	3.4	3.5	2.4	4.8	3.8	5.7	4.0	5.1		33
SOUTHEAST	12.3	14.1	17.1	17.5	19.7	20.3	20.7	20.9	21.4	17.3	13.7	11.7		33
SOUTH SOUTHEAST	15.1	12.6	16.7	20.2	22.0	25.7	33.6	30.7	20.9	13.6	11.6	13.0		33
SOUTH	8.8	8.2	9.2	13.6	19.5	21.8	24.8	21.3	14.0	8.1	8.6	8.4		33
SOUTH SOUTHWEST	1.5	1.2	2.1	2.3	2.9	2.6	1.4	3.1	1.6	1.0	1.0	1.7		33
SOUTHWEST	1.3	0.7	1.0	1.0	1.7	1.2	0.5	1.0	0.8	0.9	1.7	1.1		33
WEST SOUTHWEST	0.4	0.1	0.3	0.2	0.3	0.2	0.0	0.2	0.2	0.2	0.5	0.4		33
WEST	1.2	1.0	0.6	0.4	0.6	0.4	0.2	0.2	0.3	0.7	0.8	1.0		33
WEST NORTHWEST	1.2	0.6	0.9	0.7	0.5	0.4	0.0	0.3	0.4	0.6	0.7	0.8		33
NORTHWEST	4.2	3.6	4.0	4.6	2.9	1.9	0.9	0.5	1.9	3.2	3.7	4.2		33
NORTH NORTHWEST	5.7	5.9	6.6	6.7	5.6	5.1	1.1	1.0	4.2	4.3	5.3	5.1		33
CALM	25.0	26.0	17.7	19.0	10.2	9.6	8.1	11.2	17.0	27.9	29.7	28.0		33
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	10.7	8.1	6.8	6.2	3.5	3.1	1.9	2.2	5.5	8.2	9.9	10.4		33
NORTH NORTHEAST	1.8	1.1	0.9	1.4	0.7	0.8	0.4	0.5	0.8	1.0	1.6	2.4		33
NORTHEAST	1.3	1.0	0.9	0.8	0.9	0.4	0.2	0.4	0.4	0.7	1.1	1.5		33
EAST NORTHEAST	0.3	0.1	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.3		33
EAST	0.9	0.7	0.3	0.4	0.5	0.3	0.3	0.2	0.5	0.7	1.0	0.8		33
EAST SOUTHEAST	1.1	1.0	1.2	0.8	0.8	0.7	0.3	0.3	0.4	0.9	0.9	1.7		33
SOUTHEAST	6.3	6.3	4.3	4.1	3.0	3.1	1.5	2.1	2.3	3.4	5.7	6.9		33
SOUTH SOUTHEAST	14.8	12.8	12.1	8.6	6.3	5.8	4.9	5.6	5.3	6.1	10.5	14.4		33
SOUTH	17.7	17.7	18.8	19.2	22.2	24.6	29.2	22.1	18.4	14.4	14.5	13.8		33
SOUTH SOUTHWEST	3.5	4.5	7.5	8.5	11.9	13.8	18.2	17.7	10.5	8.1	3.7	3.2		33
SOUTHWEST	2.5	3.6	6.2	7.0	9.8	10.4	12.7	13.6	10.0	6.2	4.2	2.9		33
WEST SOUTHWEST	1.1	1.7	1.7	2.4	2.8	2.2	4.0	3.8	3.1	1.8	1.1	1.0		33
WEST	2.0	2.8	3.3	4.4	6.1	6.2	7.1	7.5	6.0	3.4	2.6	1.9		33
WEST NORTHWEST	2.2	2.7	3.5	4.1	5.5	6.9	4.4	6.4	5.7	4.5	3.0	2.2		33
NORTHWEST	8.8	10.2	11.7	14.7	12.4	11.5	6.8	6.9	12.3	14.4	11.5	9.4		33
NORTH NORTHWEST	10.2	12.6	12.1	10.2	7.6	5.4	2.5	3.2	7.5	10.6	11.5	9.9		33
CALM	14.8	13.1	8.1	6.6	5.9	4.8	5.9	9.0	11.2	19.5	16.8	18.0		33
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	10	6	2	*	*	0	0	*	*	2	6	9	33	27

EUREKA, CALIFORNIA (40°48'N., 124°10'W.) Elevation 43 ft. (13.1m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
TEMPERATURE (DEGREES F)														
MEAN	47.3	48.4	48.3	49.7	52.5	55.2	56.3	57.0	56.6	54.4	51.7	48.6	52.2	30
MEAN DAILY MAXIMUM	53.5	54.4	54.1	54.9	57.2	59.6	60.4	61.2	61.9	60.4	57.9	54.6	57.5	30
MEAN DAILY MINIMUM	41.1	42.3	42.5	44.4	47.8	50.7	52.1	52.7	51.2	48.4	45.5	42.6	46.8	30
EXTREME HIGHEST	75	85	78	79	84	85	76	82	85	82	77	77	85	65
EXTREME LOWEST	25	27	29	32	36	41	45	44	41	32	29	21	21	65
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	7.3	7.4	7.4	7.0	6.9	6.5	6.6	6.8	6.0	6.5	7.3	7.5	6.9	33
MEAN NUMBER OF DAYS WITH CLEAR SKIES	6	6	6	6	6	7	6	6	9	8	6	6	78	65
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	19	17	18	15	15	13	14	14	13	14	17	19	188	65
PRECIPITATION														
MEAN AMOUNT (INCHES)	7.42	5.15	4.83	2.95	2.11	0.66	0.14	0.27	0.65	3.23	5.77	6.58	39.76	30
GREATEST AMOUNT (INCHES)	13.92	13.94	13.97	10.68	6.05	2.57	1.20	1.98	2.35	13.04	16.58	12.87	53.30	40
LEAST AMOUNT (INCHES)	1.63	1.20	1.23	0.31	0.03	*	0.00	0.00	*	0.49	0.01	1.56	24.70	40
MAXIMUM IN 24 HRS. (INCHES)	4.42	4.88	4.02	2.56	2.23	1.73	1.18	0.93	1.32	5.83	4.55	4.17	5.83	65
MEAN AMOUNT OF SNOW (INCHES)	0.2	*	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.2	65
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	3.0	0.5	1.0	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	3.0	65
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	*	0	0	0	0	0	0	0	0	0	0	0	*	65
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	17	14	15	12	8	5	2	2	4	9	13	16	118	65
WIND														
MEAN WIND SPEED (KNOTS)	6.0	6.3	6.6	6.9	6.7	6.4	5.9	5.0	4.8	4.9	5.2	5.6	5.9	54
PREVAILING WIND DIRECTION	SE	SE	N	N	N	N	N	NW	N	N	SE	SE	N	54
MAXIMUM WIND SPEED (KNOTS)	47	42	42	43	35	34	30	30	38	49	37	49	49	65
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	4	3	2	2	1	2	3	5	7	9	7	4	49	54

PORTLAND, OREGON (45°36'N., 122°36'W.) Elevation 21 ft. (6.4m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1018.5	1018.6	1017.5	1018.1	1017.7	1016.8	1017.2	1016.6	1016.3	1017.9	1018.4	1018.0	1017.6	24
TEMPERATURE (DEGREES F)														
MEAN	38.1	42.8	45.7	50.6	56.7	62.0	67.1	66.6	62.2	53.8	45.3	40.7	52.6	30
MEAN DAILY MAXIMUM	43.6	50.1	54.3	60.3	67.0	72.1	79.0	78.1	73.9	62.9	52.1	46.0	61.6	30
MEAN DAILY MINIMUM	32.5	35.5	37.0	40.8	46.3	51.8	55.2	55.0	50.5	44.7	38.5	35.3	43.6	30
EXTREME HIGHEST	62	70	80	87	92	100	107	104	101	90	73	64	107	35
EXTREME LOWEST	-2	-3	19	29	29	39	43	44	34	26	13	6	-3	35
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	82	79	72	68	66	65	61	64	66	79	82	84	72	35
AVERAGE PERCENTAGE (1600L)	76	68	60	55	53	49	45	46	49	64	74	79	60	35
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	8.6	8.3	8.1	7.7	7.1	6.8	4.5	5.1	5.4	7.2	8.3	8.9	7.2	27
MEAN NUMBER OF DAYS WITH CLEAR SKIES	2	3	3	4	5	6	14	11	11	5	3	2	69	27
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	26	22	24	21	19	17	9	10	12	19	23	27	229	27
PRECIPITATION														
MEAN AMOUNT (INCHES)	5.88	4.06	3.64	2.22	2.09	1.59	0.47	0.82	1.60	3.59	5.61	6.04	37.61	30
GREATEST AMOUNT (INCHES)	12.83	9.46	7.52	4.72	4.57	3.58	2.01	4.53	3.96	8.04	11.57	11.12	31.09	35
LEAST AMOUNT (INCHES)	1.02	0.78	1.10	0.53	0.57	0.03	0.00	*	*	0.72	1.44	1.90	23.37	35
MAXIMUM IN 24 HRS. (INCHES)	2.61	2.00	1.83	1.47	1.47	1.82	0.91	1.38	2.23	2.18	2.62	2.17	2.62	35
MEAN AMOUNT OF SNOW (INCHES)	4.4	0.8	0.6	*	*	0.0	0.0	0.0	*	*	0.2	1.5	7.5	35
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	10.6	3.2	7.7	*	0.5	0.0	0.0	0.0	*	0.2	4.5	8.0	10.6	35
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	1	*	*	0	0	0	0	0	0	0	*	1	2	35
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	19	16	17	14	11	9	3	5	7	13	18	19	153	35
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	8.0	6.7	6.4	5.3	4.7	4.4	4.5	4.2	4.1	4.9	6.5	7.8		24
MEAN WIND SPEED (KNOTS) (1300L)	9.7	9.0	9.0	8.0	7.0	7.0	7.4	6.9	7.1	7.3	8.7	9.5		24
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	1.0	1.0	1.0	1.8	4.3	6.9	11.1	7.3	3.6	1.8	1.6	1.3		24
NORTH NORTHEAST	0.6	1.0	0.3	0.8	1.6	1.5	2.8	2.2	1.4	0.6	0.9	0.9		24
NORTHEAST	1.5	1.3	0.7	0.8	1.5	1.8	2.7	1.9	1.0	0.8	1.2	1.0		24
EAST NORTHEAST	2.0	1.3	0.8	0.7	1.1	1.5	1.7	0.9	0.9	0.8	1.2	1.1		24
EAST	9.4	6.2	5.1	3.4	3.8	2.8	2.1	2.2	2.4	3.1	4.0	5.6		24
EAST SOUTHEAST	25.4	23.1	18.2	13.1	6.8	5.4	3.8	4.4	8.3	14.3	20.2	26.5		24
SOUTHEAST	10.1	9.8	7.8	6.7	4.7	4.0	2.6	5.3	8.7	9.8	11.2	10.2		24
SOUTH SOUTHEAST	5.7	4.2	5.5	5.4	3.2	4.1	2.6	5.2	5.3	5.0	5.7	4.5		24
SOUTH	8.8	7.8	10.3	9.4	7.0	7.4	4.3	6.5	7.6	9.3	8.5	8.6		24
SOUTH SOUTHWEST	8.2	9.1	12.5	10.3	8.4	6.7	3.5	3.9	4.7	6.5	8.1	10.2		24
SOUTHWEST	4.7	4.8	5.0	5.0	4.3	4.1	2.5	2.9	4.9	5.4	4.3	5.3		24
WEST SOUTHWEST	[illegible]	2.1	3.3	2.9	3.3	1.8	1.9	1.8	2.9	3.2	2.8	2.3		24
WEST	[illegible]	3.5	4.2	4.6	4.5	3.7	2.9	3.9	6.0	5.5	3.7	3.3		24
WEST NORTHWEST	[illegible]	3.4	4.7	8.3	8.6	6.2	8.8	8.5	8.9	6.2	5.1	2.9		24
NORTHWEST	3.1	3.4	4.6	6.8	14.4	14.9	19.6	17.6	11.2	6.6	5.4	1.8		24
NORTH NORTHWEST	1.5	1.5	1.6	3.3	7.6	11.0	15.8	9.9	5.4	2.7	1.4	1.2		24
CALM	10.1	16.7	16.5	16.7	14.9	10.2	11.4	15.4	17.2	18.3	14.8	13.3		24
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	1.6	2.3	3.7	5.1	5.9	7.0	6.4	6.2	6.1	2.7	2.0	1.7		24
NORTH NORTHEAST	0.6	1.0	1.3	2.4	2.8	2.7	1.8	1.8	2.2	1.1	1.2	0.8		24
NORTHEAST	1.2	2.4	1.6	3.5	2.7	2.9	2.0	3.1	2.3	2.2	1.2	0.7		24
EAST NORTHEAST	1.8	2.0	2.9	2.8	3.3	2.3	1.6	2.2	3.3	1.8	1.7	2.0		24
EAST	10.1	6.7	7.3	5.1	5.3	2.8	2.1	2.3	6.3	3.2	6.2	7.0		24
EAST SOUTHEAST	23.1	18.1	9.1	5.0	3.6	2.3	1.1	1.4	3.2	11.7	19.1	24.6		24
SOUTHEAST	9.1	8.0	5.6	2.3	2.2	0.9	0.7	1.6	2.2	5.7	9.8	9.3		24
SOUTH SOUTHEAST	4.5	3.4	2.5	2.5	1.5	1.2	1.0	1.0	2.0	2.3	3.6	3.2		24
SOUTH	8.6	7.8	8.6	7.1	4.3	4.4	1.9	3.6	4.5	9.4	9.3	8.1		24
SOUTH SOUTHWEST	10.8	12.0	12.7	10.2	6.3	5.4	2.2	3.3	4.6	8.3	9.9	12.9		24
SOUTHWEST	4.8	5.8	7.9	7.4	6.0	5.0	3.3	3.2	4.0	5.8	5.4	5.8		24
WEST SOUTHWEST	4.3	4.2	8.3	6.7	5.0	3.5	2.3	2.8	4.8	3.1	2.6	3.2		24
WEST	3.9	6.0	5.7	8.7	6.2	7.6	8.4	7.7	7.0	7.1	4.8	3.4		24
WEST NORTHWEST	4.9	6.8	9.5	11.6	10.8	18.7	26.0	25.0	19.2	12.6	6.8	4.2		24
NORTHWEST	3.7	6.0	7.8	12.1	17.9	21.0	26.5	23.8	18.2	11.6	7.3	5.5		24
NORTH NORTHWEST	1.9	3.2	4.3	7.1	8.5	10.7	11.7	9.8	7.6	4.7	2.8	2.2		24
CALM	4.9	4.4	3.0	2.5	1.6	1.6	1.2	1.3	2.5	4.6	6.2	5.2		24
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	4	4	2	1	*	*	*	*	3	8	6	5	33	33

BEST DOCUMENT AVAILABLE

ASTORIA, OREGON (46°09'N., 123°53'W.) Elevation 8 ft. (2.4m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1017.0	1018.4	1018.6	1018.0	1018.3	1018.1	1018.8	1018.2	1017.0	1017.4	1017.0	1017.6	1017.7	14
TEMPERATURE (DEGREES F)														
MEAN	40.8	43.6	44.4	47.8	52.2	56.5	60.0	60.3	58.4	52.8	46.3	42.8	50.5	30
MEAN DAILY MAXIMUM	46.5	50.6	52.1	55.6	60.3	63.8	67.7	67.8	67.6	61.0	53.4	48.6	58.0	30
MEAN DAILY MINIMUM	34.6	36.6	36.7	40.0	44.3	49.1	52.2	52.2	49.2	44.5	39.6	36.9	42.0	30
EXTREME HIGHEST	63	72	72	83	88	93	100	93	98	81	71	63	100	22
EXTREME LOWEST	11	19	22	29	30	38	39	39	33	26	13	6	6	22
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	83	82	78	74	73	76	75	77	78	81	83	85	79	22
AVERAGE PERCENTAGE (1600L)	79	74	71	69	70	72	69	70	70	74	78	81	73	22
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	8.6	8.2	8.1	8.1	7.6	7.7	6.6	6.5	6.2	7.3	8.2	8.6	7.6	22
MEAN NUMBER OF DAYS WITH CLEAR SKIES	3	3	3	3	3	3	6	7	9	5	3	2	50	22
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	25	22	23	22	20	20	13	15	14	19	22	23	242	22
PRECIPITATION														
MEAN AMOUNT (INCHES)	9.73	7.82	6.62	4.61	2.72	2.43	0.96	1.46	2.93	6.80	9.78	10.37	66.34	30
GREATEST AMOUNT (INCHES)	18.94	21.89	13.47	8.04	6.00	5.48	4.20	5.22	6.95	12.86	16.93	16.37	87.39	22
LEAST AMOUNT (INCHES)	4.76	2.60	0.93	1.33	1.03	0.75	0.01	0.08	0.04	1.85	2.37	0.12	60.33	22
MAXIMUM IN 24 HRS. (INCHES)	4.32	2.86	2.66	2.26	1.76	2.42	1.98	1.65	2.03	3.47	3.48	3.61	4.32	22
MEAN AMOUNT OF SNOW (INCHES)	3.4	0.3	1.0	0.1	*	0.0	0.0	0.0	*	*	0.2	1.9	6.9	22
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	10.8	4.0	5.9	1.0	*	0.0	0.0	0.0	*	*	2.0	7.2	10.8	22
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	1	*	1	*	0	0	0	0	0	0	*	*	2	22
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	24	20	21	18	14	18	7	9	10	17	21	24	199	22
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	7.9	6.8	6.1	5.6	5.0	5.0	5.0	4.3	4.6	5.4	6.7	7.4		15
MEAN WIND SPEED (KNOTS) (1300L)	9.4	9.2	9.8	10.2	10.7	10.1	10.2	9.7	8.9	6.5	8.5	8.4		15
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	0.3	1.0	0.7	1.0	3.1	5.0	4.7	3.1	0.9	0.7	0.4	0.5		15
NORTH NORTHEAST	0.7	0.5	0.3	0.4	2.0	1.3	1.3	0.6	0.4	0.3	0.3	0.2		15
NORTHEAST	3.3	3.1	2.9	3.1	3.0	3.0	1.2	0.9	2.3	2.0	2.2	2.9		15
EAST NORTHEAST	6.6	6.9	4.9	4.5	3.4	2.0	1.3	1.0	2.2	3.9	3.4	7.5		15
EAST	10.1	10.2	10.6	9.1	6.8	3.0	2.3	2.7	6.3	8.7	13.8	14.5		15
EAST SOUTHEAST	17.8	13.6	12.5	9.8	7.1	4.9	3.9	6.1	9.8	13.9	16.0	18.0		15
SOUTHEAST	11.0	13.2	16.2	19.2	12.0	11.4	8.8	13.2	21.8	22.1	17.0	12.1		15
SOUTH SOUTHEAST	7.4	7.8	8.4	9.2	8.3	8.2	8.0	7.0	13.9	10.3	8.6	9.0		15
SOUTH	6.3	7.4	8.1	8.2	7.1	5.0	7.6	10.8	6.0	8.3	6.7	7.7		15
SOUTH SOUTHWEST	7.4	6.8	5.6	4.9	3.9	5.5	3.1	5.4	4.1	7.3	7.1	7.5		15
SOUTHWEST	5.0	6.0	4.8	5.5	5.1	6.4	6.3	7.8	5.0	4.9	3.9	6.3		15
WEST SOUTHWEST	3.6	3.6	4.7	5.1	5.0	5.4	3.5	5.1	3.2	2.1	2.0	2.4		15
WEST	3.3	4.6	4.9	6.5	4.4	6.8	7.9	6.0	4.6	1.6	3.3	2.7		15
WEST NORTHWEST	2.8	3.3	3.2	4.9	7.8	6.5	7.4	3.7	3.2	1.4	3.4	3.1		15
NORTHWEST	1.2	1.8	2.3	3.2	7.9	6.9	12.7	7.1	3.4	0.9	1.8	0.9		15
NORTH NORTHWEST	0.3	1.0	0.3	1.5	3.3	7.1	8.6	4.9	2.1	0.7	0.3	0.2		15
CALM	5.0	8.9	9.4	8.0	9.8	9.0	10.7	12.1	11.6	10.8	7.8	7.5		15
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	1.9	0.7	5.2	4.4	3.1	3.7	2.2	4.5	6.4	6.1	4.4	2.5		15
NORTH NORTHEAST	2.7	4.2	4.4	3.9	0.9	0.7	0.4	0.8	2.4	4.5	4.3	2.0		15
NORTHEAST	8.3	8.6	7.1	3.2	1.0	0.8	0.3	0.4	3.4	6.9	10.4	7.0		15
EAST NORTHEAST	14.1	8.4	4.8	1.2	1.0	0.2	0.2	0.2	3.3	6.5	9.2	10.4		15
EAST	12.6	4.1	2.6	0.3	0.6	0.5	0.2	0.3	0.5	4.0	8.7	11.7		15
EAST SOUTHEAST	8.0	3.1	2.6	0.5	0.5	0.2	0.0	0.2	0.4	3.7	6.0	12.3		15
SOUTHEAST	6.2	4.0	3.9	1.5	0.6	0.2	0.0	0.5	0.7	1.8	4.3	6.2		15
SOUTH SOUTHEAST	2.3	3.1	2.5	2.1	0.5	0.2	0.2	0.1	0.5	1.7	3.7	3.5		15
SOUTH	8.3	7.4	7.0	4.2	2.2	2.4	1.0	1.4	3.2	5.6	7.7	3.9		15
SOUTH SOUTHWEST	9.2	9.0	11.1	10.4	3.9	4.9	4.5	5.2	7.2	13.3	10.6	9.3		15
SOUTHWEST	8.1	7.9	11.6	13.3	13.6	12.6	7.7	10.8	12.3	12.7	7.6	7.3		15
WEST SOUTHWEST	4.6	6.2	8.3	12.2	12.9	12.4	13.0	13.6	11.7	8.6	6.4	5.4		15
WEST	3.5	5.0	6.5	9.6	12.2	13.7	12.8	12.5	7.8	4.2	2.5	4.3		15
WEST NORTHWEST	4.0	7.1	7.2	12.9	19.1	15.5	21.0	16.6	9.6	4.5	4.9	3.7		15
NORTHWEST	1.8	6.2	9.8	12.6	18.3	16.7	25.5	22.6	14.1	7.9	3.1	2.4		15
NORTH NORTHWEST	0.6	3.8	4.5	7.6	8.8	13.2	10.9	10.1	12.1	5.9	2.3	1.1		15
CALM	3.8	2.4	1.0	0.5	0.0	0.3	0.0	0.3	1.1	2.3	4.0	4.8		15
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	4	3	2	2	2	2	2	5	6	7	4	4	43	22

SEATTLE, WASHINGTON (47°27'N., 122°18'W.) Elevation 400 ft. (122.0m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1017.6	1017.7	1016.2	1017.7	1017.6	1017.1	1017.8	1017.1	1016.8	1017.3	1017.8	1016.9	1017.3	23
TEMPERATURE (DEGREES F)														
MEAN	38.2	42.3	44.1	48.7	54.9	59.8	64.5	63.8	59.6	52.2	44.6	40.5	51.1	30
MEAN DAILY MAXIMUM	43.4	48.5	51.5	57.0	64.1	69.0	75.1	73.8	68.7	59.4	50.4	45.4	58.8	30
MEAN DAILY MINIMUM	33.0	36.0	36.6	40.3	45.6	50.6	53.8	53.7	50.4	44.9	38.8	35.5	43.3	30
EXTREME HIGHEST	61	70	71	77	93	94	97	99	93	81	72	60	99	16
EXTREME LOWEST	12	18	23	29	33	41	45	48	35	35	22	6	6	16
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	79	76	74	72	68	67	66	70	74	80	81	81	76	16
AVERAGE PERCENTAGE (1600L)	75	66	62	59	54	56	49	52	58	69	79	78	62	16
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	8.5	8.2	8.0	7.8	7.1	7.1	5.2	5.7	6.1	7.6	8.4	8.8	7.4	31
MEAN NUMBER OF DAYS WITH CLEAR SKIES	2	3	3	3	4	5	11	9	8	4	2	2	56	31
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	25	21	22	20	17	18	10	13	13	20	23	26	228	31
PRECIPITATION														
MEAN AMOUNT (INCHES)	5.79	4.19	3.61	2.46	1.70	1.53	0.71	1.08	1.99	3.91	5.88	5.94	38.79	30
GREATEST AMOUNT (INCHES)	12.92	9.11	8.40	4.12	4.76	3.20	2.10	4.59	5.57	8.95	9.69	9.50	55.14	31
LEAST AMOUNT (INCHES)	0.86	1.66	0.57	0.33	0.35	0.13	*	0.01	*	0.72	1.11	3.75	23.78	31
MAXIMUM IN 24 HRS. (INCHES)	2.41	3.41	2.86	1.85	1.83	1.75	0.84	1.75	1.77	2.27	3.41	2.53	3.41	31
MEAN AMOUNT OF SNOW (INCHES)	7.2	1.7	1.7	0.1	*	0.0	0.0	0.0	*	0.1	1.0	3.4	15.20	31
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	21.4	7.2	5.6	2.3	*	0.0	0.0	0.0	*	2.0	9.[illegible]	13.0	21.40	31
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	2	1	1	*	0	0	0	0	0	*	*	1	5	31
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	20	16	18	14	10	10	5	7	9	14	18	21	161	31
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	5.9	5.6	5.4	5.2	4.8	4.8	4.4	4.3	4.3	5.1	5.[illegible]	5.8		23
MEAN WIND SPEED (KNOTS) (1300L)	6.8	6.7	7.0	7.0	6.3	6.1	5.9	5.8	6.0	6.3	6.3	6.7		23
DIRECTION (PERCENTAGE OF OBS.) AT 0700L														
NORTH	3.8	9.4	11.0	11.2	13.3	12.4	15.2	14.9	14.3	10.0	10.2	6.4		23
NORTH NORTHEAST	3.2	2.6	1.9	3.4	4.1	4.5	6.2	5.5	5.1	3.3	3.1	2.8		23
NORTHEAST	4.8	5.5	3.6	3.6	4.0	4.9	6.3	6.3	7.7	6.0	3.2	4.8		23
EAST NORTHEAST	3.9	3.2	2.5	3.0	3.2	3.2	4.5	3.4	4.8	4.7	4.3	4.6		23
EAST	4.3	4.8	2.9	2.0	2.4	3.6	2.9	3.3	4.0	4.0	4.3	4.8		23
EAST SOUTHEAST	2.0	1.1	1.6	1.9	1.6	1.8	1.8	0.8	1.4	1.4	1.5	2.4		23
SOUTHEAST	4.1	3.5	2.4	4.5	2.8	3.5	2.6	2.1	2.9	3.5	3.7	3.7		23
SOUTH SOUTHEAST	6.0	6.6	7.3	6.0	6.8	6.9	4.6	4.1	4.5	6.9	6.7	6.6		23
SOUTH	24.1	22.0	24.9	27.9	25.5	23.0	18.4	16.7	14.7	20.2	21.3	23.1		23
SOUTH SOUTHWEST	11.3	10.6	12.1	12.1	13.2	13.0	10.7	13.9	9.5	10.4	10.5	11.3		23
SOUTHWEST	3.4	2.3	2.7	3.2	2.4	4.4	6.8	7.0	3.8	3.4	3.4	7.4		23
WEST SOUTHWEST	0.4	0.5	0.3	0.7	0.3	0.9	1.0	1.1	0.7	1.1	0.8	1.5		23
WEST	0.4	0.5	0.3	0.4	0.2	0.2	0.4	1.0	0.8	0.7	0.8	1.2		23
WEST NORTHWEST	0.5	0.3	0.1	0.3	*	0.3	0.2	0.4	0.7	0.6	0.3	0.6		23
NORTHWEST	2.1	2.0	1.9	1.5	1.1	1.6	1.8	2.4	4.2	4.1	3.7	2.7		23
NORTH NORTHWEST	9.1	10.5	8.3	7.4	8.4	7.8	9.4	9.1	11.2	7.7	8.9	7.9		23
CALM	11.5	14.6	10.1	11.0	10.6	7.8	8.0	8.0	9.6	12.1	11.2	12.3		23
DIRECTION (PERCENTAGE OF OBS.) AT 1300L														
NORTH	7.9	8.7	6.6	9.4	14.7	15.6	18.4	15.1	14.8	10.1	10.2	7.8		23
NORTH NORTHEAST	2.5	1.5	1.1	1.2	1.9	2.6	2.9	1.8	1.6	1.9	2.2	2.9		23
NORTHEAST	3.2	1.8	1.4	1.3	1.4	1.9	1.8	1.7	2.0	1.8	2.4	3.1		23
EAST NORTHEAST	2.6	1.4	1.5	1.0	1.2	0.8	0.8	0.9	0.8	1.1	2.5	3.1		23
EAST	3.3	2.7	2.3	1.9	2.6	2.0	1.9	1.8	1.8	2.9	3.2	4.6		23
EAST SOUTHEAST	2.5	2.6	2.3	3.3	3.6	2.8	3.0	2.7	1.9	1.8	2.9	2.6		23
SOUTHEAST	4.9	5.1	5.9	6.9	7.8	7.3	7.5	7.5	6.0	6.3	5.3	4.3		23
SOUTH SOUTHEAST	8.3	8.1	9.3	9.5	9.8	11.3	11.0	9.3	8.1	8.8	7.1	6.7		23
SOUTH	20.5	27.5	28.9	25.1	20.0	19.6	18.5	19.0	20.6	24.0	25.7	27.0		23
SOUTH SOUTHWEST	13.0	13.1	13.8	11.9	7.9	9.3	7.6	8.7	6.6	12.2	11.1	14.3		23
SOUTHWEST	5.0	3.8	4.7	6.8	5.1	5.9	4.9	5.4	4.8	5.1	5.0	4.4		23
WEST SOUTHWEST	0.7	0.7	1.1	1.9	2.1	2.1	1.4	2.7	1.7	0.9	1.0	1.1		23
WEST	0.4	1.0	0.8	1.4	1.4	1.6	1.2	1.6	1.0	1.3	0.9	0.5		23
WEST NORTHWEST	0.1	0.4	0.4	0.3	0.8	0.6	0.7	1.0	0.6	0.4	0.3	0.1		23
NORTHWEST	1.9	2.4	3.2	2.5	2.3	2.6	3.1	5.0	6.1	3.2	2.2	1.6		23
NORTH NORTHWEST	5.8	9.8	9.9	12.3	15.1	12.8	15.4	13.5	18.5	10.4	7.9	5.3		23
CALM	11.1	9.3	6.7	3.3	2.5	2.2	2.0	2.3	3.3	7.9	10.2	10.5		23
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	5	3	3	1	1	1	2	3	7	8	6	6	47	31

QUILLAYUTE, WASHINGTON (47°57'N., 124°33'W.) Elevation 179 ft. (54.6m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
STATION LEVEL PRESSURE														
MEAN (MILLIBARS)	1007.9	1007.9	1005.4	1011.9	1010.9	1010.9	1011.1	1010.7	1010.7	1009.1	1005.3	1009.0	1009.2	3
TEMPERATURE (DEGREES F)														
MEAN	38.7	41.4	42.1	45.8	51.0	55.2	59.0	58.8	56.8	50.7	44.1	40.6	48.7	30
MEAN DAILY MAXIMUM	44.0	47.8	49.4	53.7	59.7	63.0	67.7	67.5	66.3	58.7	50.6	45.7	56.2	30
MEAN DAILY MINIMUM	33.3	34.9	34.7	37.9	42.2	47.3	50.3	50.1	47.3	42.7	37.6	35.4	41.1	30
EXTREME HIGHEST	59	72	69	75	89	92	92	96	92	81	67	64	96	9
EXTREME LOWEST	7	15	19	24	31	36	38	36	28	24	23	7	7	9
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	89	86	82	76	72	74	72	75	75	85	89	90	80	9
AVERAGE PERCENTAGE (1600L)	85	76	73	69	65	67	63	66	65	76	84	86	73	9
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	8.8	8.1	7.9	8.2	7.9	7.8	6.3	6.5	6.2	7.4	8.5	8.5	7.7	9
MEAN NUMBER OF DAYS WITH CLEAR SKIES	2	3	4	2	2	3	8	7	8	5	2	3	49	9
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	26	20	22	22	21	20	15	16	15	20	23	25	245	9
PRECIPITATION														
MEAN AMOUNT (INCHES)	14.60	11.95	10.79	8.15	4.71	3.50	2.36	2.75	5.16	11.58	15.84	15.60	104.99	30
GREATEST AMOUNT (INCHES)	23.34	17.45	21.86	13.89	12.45	5.47	9.33	10.12	10.93	27.17	24.28	23.47	131.64	9
LEAST AMOUNT (INCHES)	12.92	5.09	7.43	2.94	1.05	0.40	0.43	0.45	0.36	2.30	8.40	12.87	91.27	9
MAXIMUM IN 24 HRS. (INCHES)	8.32	4.00	4.23	2.77	3.54	1.56	6.45	3.12	4.13	5.54	3.90	6.76	8.32	9
MEAN AMOUNT OF SNOW (INCHES)	10.9	3.3	2.5	0.9	*	*	0.0	0.0	*	*	1.0	3.6	22.2	10
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	3	1	1	*	0	0	0	0	0	0	*	1	7	9
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	25	19	22	20	14	14	10	11	12	20	23	25	216	9
WIND														
MEAN WIND SPEED (KNOTS)	7.1	6.2	6.6	6.2	5.8	5.6	5.2	4.9	4.9	5.6	6.2	6.6	5.9	9
MAXIMUM WIND SPEED (KNOTS)	30	30	29	28	23	19	20	23	29	26	32	34	34	9
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	3	2	3	2	4	4	4	7	6	6	4	4	49	7

TATOOSH ISLAND, WASHINGTON (48°23'N., 124°44'W.) Elevation 101 ft. (30.8m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
TEMPERATURE (DEGREES F)														
MEAN	42.0	43.1	44.2	47.5	51.1	53.9	55.5	56.0	54.8	51.9	47.2	44.4	49.3	30
MEAN DAILY MAXIMUM	45.2	46.6	47.9	51.6	55.2	57.8	59.5	60.1	59.2	55.8	50.5	47.6	53.1	30
MEAN DAILY MINIMUM	38.8	39.5	40.4	43.3	47.0	50.0	51.5	51.8	50.4	48.0	43.9	41.1	45.5	30
EXTREME HIGHEST	64	64	69	75	81	84	88	78	80	77	68	61	88	63
EXTREME LOWEST	14	16	25	33	36	43	44	45	40	33	19	14	14	63
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (1000L)	82	81	80	80	82	86	89	90	87	85	83	83	84	48
AVERAGE PERCENTAGE (1600L)	82	80	79	79	81	84	87	90	86	85	84	83	83	63
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	8.0	7.5	7.4	7.3	7.2	7.2	6.9	7.1	6.5	7.1	8.0	3.1	7.3	59
MEAN NUMBER OF DAYS WITH CLEAR SKIES	4	5	5	5	5	4	6	5	7	6	3	3	58	63
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	23	19	20	19	18	17	17	18	16	19	22	23	231	63
PRECIPITATION														
MEAN AMOUNT (INCHES)	10.82	8.70	6.54	5.23	3.00	2.84	2.34	1.98	3.55	8.22	10.51	12.16	77.69	30
GREATEST AMOUNT (INCHES)	22.57	21.16	14.80	10.79	8.05	7.81	7.73	5.06	7.81	14.54	22.17	16.81	101.64	38
LEAST AMOUNT (INCHES)	1.84	1.04	2.94	0.68	0.64	0.48	0.24	0.18	0.07	2.50	2.85	5.84	58.61	38
MAXIMUM IN 24 HRS. (INCHES)	3.67	4.57	4.76	3.70	2.22	2.75	3.72	2.30	3.79	5.91	4.38	4.05	5.91	63
MEAN AMOUNT OF SNOW (INCHES)	3.5	1.3	1.1	*	*	0.0	0.0	0.0	0.0	*	0.4	1.2	7.7	63
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	9.6	12.0	10.8	0.6	0.1	0.0	0.0	0.0	0.0	*	6.8	7.0	12.0	63
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	1	*	*	0	0	0	0	0	0	0	*	*	3	63
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	22	18	20	17	14	12	10	11	11	17	21	23	197	63
WIND														
MEAN WIND SPEED (KNOTS)	17.4	15.4	13.6	11.8	10.1	8.7	8.8	8.6	9.9	13.2	15.9	17.1	12.5	33
PREVAILING WIND DIRECTION	E	E	E	W	W	SW	S	S	S	E	E	E	E	24
MAXIMUM WIND SPEED (KNOTS)	76	73	79	63	57	63	46	51	59	73	52	74	82	63
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	1	1	1	2	3	5	11	16	11	6	2	1	59	63

448 BEST DOCUMENT AVAILABLE

[redacted]

HILO, HAWAII (19°43'N., 155°04'W.) Elevation 27 ft. (8.2m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1015.8	1016.1	1017.0	1017.4	1017.7	1017.6	1016.9	1016.3	1015.5	1015.8	1016.1	1016.3	1016.5	18
TEMPERATURE (DEGREES F)														
MEAN	71.2	71.0	71.1	72.2	73.3	74.6	75.3	75.9	75.6	75.0	73.5	71.6	73.4	30
MEAN DAILY MAXIMUM	79.6	79.4	78.8	79.8	81.3	82.7	83.0	83.5	83.6	83.2	81.3	79.4	81.3	30
MEAN DAILY MINIMUM	62.8	62.6	63.3	64.6	65.6	66.5	67.5	68.2	67.6	66.7	65.6	63.7	65.4	30
EXTREME HIGHEST	89	92	93	89	94	90	88	93	92	91	88	90	94	29
EXTREME LOWEST	54	53	54	56	58	60	62	63	61	62	58	56	53	29
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (0800L)	80	80	81	82	80	78	81	81	79	80	82	82	81	26
AVERAGE PERCENTAGE (1400L)	67	67	67	69	68	65	67	68	67	68	70	70	68	26
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	6.7	6.9	7.7	8.2	8.0	7.6	7.7	7.6	7.1	7.2	7.4	7.1	7.4	29
MEAN NUMBER OF DAYS WITH CLEAR SKIES	5	4	2	1	1	2	1	1	3	3	3	4	30	29
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	14	14	19	21	20	18	18	19	15	16	17	16	207	29
PRECIPITATION														
MEAN AMOUNT (INCHES)	9.07	12.90	13.69	12.88	10.07	6.61	9.54	10.88	7.44	10.96	13.77	13.76	133.57	30
GREATEST AMOUNT (INCHES)	29.11	43.66	31.91	31.94	25.01	15.50	14.89	26.42	13.63	26.10	27.03	30.82	173.23	33
LEAST AMOUNT (INCHES)	0.36	1.70	0.88	2.93	1.18	2.68	3.83	2.06	1.59	2.40	3.74	0.77	71.45	33
MAXIMUM IN 24 HRS. (INCHES)	9.94	15.70	9.18	11.07	10.26	2.83	5.42	9.65	6.02	8.88	13.59	10.30	15.70	33
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	18	18	24	25	25	24	27	27	23	24	24	22	282	33
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	5.8	6.0	5.6	5.4	5.2	5.1	5.0	5.3	5.1	5.2	5.3	5.7		18
MEAN WIND SPEED (KNOTS) (1300L)	9.8	10.0	10.5	10.2	9.4	9.9	9.3	9.2	9.0	8.8	8.6	8.8		18
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	1.1	2.1	3.2	3.5	4.2	2.4	2.6	3.0	2.4	2.5	2.3	2.9		18
NORTH NORTHEAST	0.6	1.7	1.2	1.5	1.5	1.5	1.4	2.0	1.2	1.2	1.0	1.6		18
NORTHEAST	0.7	2.0	1.7	2.4	2.2	1.6	2.0	2.6	1.6	1.9	1.3	1.0		16
EAST NORTHEAST	1.1	1.5	1.0	1.6	1.3	1.7	1.6	2.2	1.1	0.6	1.2	0.8		18
EAST	0.8	1.2	0.9	1.9	2.0	2.4	2.6	1.6	1.3	0.5	1.1	0.8		18
EAST SOUTHEAST	0.9	0.7	1.4	1.9	1.1	1.6	1.1	1.9	1.3	1.2	0.7	0.6		18
SOUTHEAST	1.7	1.0	3.0	2.2	2.0	2.8	1.5	2.6	2.1	1.7	1.6	1.2		18
SOUTH SOUTHEAST	3.4	2.7	2.0	2.1	2.1	2.0	1.9	1.4	1.6	2.0	1.7	1.8		18
SOUTH	6.3	6.0	6.6	6.4	5.7	5.1	3.1	4.1	4.0	4.3	5.3	5.7		18
SOUTH SOUTHWEST	14.8	12.8	11.1	7.5	7.5	6.7	5.9	5.7	7.4	10.7	10.9	12.4		18
SOUTHWEST	27.8	24.6	24.6	18.5	14.2	18.0	13.3	14.8	20.1	21.5	22.5	29.0		18
WEST SOUTHWEST	23.6	20.8	19.6	20.2	19.4	24.1	23.9	22.5	24.3	27.9	24.3	22.4		18
WEST	6.9	10.3	9.8	14.4	16.7	14.2	18.0	18.3	15.6	10.3	10.9	8.1		18
WEST NORTHWEST	2.0	2.2	2.4	3.9	5.0	3.2	3.8	5.8	3.8	2.5	3.6	2.3		18
NORTHWEST	1.2	3.2	2.7	3.4	4.4	2.8	4.4	3.4	2.6	3.0	2.1	2.3		18
NORTH NORTHWEST	1.2	2.5	2.8	2.8	3.0	1.7	2.8	7.1	1.9	1.7	2.5	2.3		18
CALM	5.8	4.6	3.9	5.8	7.7	8.1	7.9	6.0	7.5	6.3	6.9	4.9		18
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	13.8	14.7	15.1	10.8	12.5	8.1	13.3	10.4	12.2	11.8	14.4	12.9		18
NORTH NORTHEAST	9.2	11.3	10.7	12.9	10.2	11.1	12.9	12.6	14.6	12.5	10.2	10.9		18
NORTHEAST	9.6	11.4	12.0	14.7	16.1	16.7	20.9	19.9	17.5	14.9	10.9	9.6		18
EAST NORTHEAST	7.3	8.3	9.8	10.8	14.2	19.9	15.6	18.7	14.8	12.0	10.2	8.7		18
EAST	11.4	12.8	14.4	16.0	19.3	19.9	14.7	15.1	14.3	14.5	12.9	11.7		18
EAST SOUTHEAST	14.7	14.2	16.6	13.7	11.9	11.7	8.3	6.9	8.5	13.8	13.2	13.7		18
SOUTHEAST	12.1	7.4	5.9	6.0	3.4	2.4	1.5	2.8	2.8	5.2	5.9	8.5		18
SOUTH SOUTHEAST	6.6	2.8	2.9	2.2	1.0	0.8	0.2	0.5	0.8	1.9	2.3	3.2		18
SOUTH	3.8	2.7	2.9	1.1	0.5	0.3	0.3	0.5	0.6	1.2	1.7	2.3		18
SOUTH SOUTHWEST	1.0	2.0	1.1	0.6	0.3	0.3	0.3	0.5	0.5	0.6	1.1	1.7		18
SOUTHWEST	1.1	1.4	0.8	0.4	0.5	0.6	0.4	0.9	0.6	0.8	1.6	1.6		18
WEST SOUTHWEST	1.1	1.8	0.8	1.0	0.7	1.0	0.8	0.6	1.1	1.1	2.2	2.8		18
WEST	1.3	1.8	1.1	1.5	1.3	1.2	1.4	1.3	2.7	1.6	2.4	1.6		18
WEST NORTHWEST	1.3	1.5	1.4	1.7	2.2	1.5	1.8	2.5	2.4	1.8	1.5	1.7		18
NORTHWEST	1.2	1.8	1.3	2.4	2.3	1.7	3.1	1.4	2.2	2.1	3.1	2.5		18
NORTH NORTHWEST	3.2	3.2	2.7	3.2	2.8	2.4	3.6	4.4	3.5	3.5	4.3	5.0		18
CALM	1.1	1.1	0.5	1.0	0.7	0.6	0.5	0.9	0.7	0.9	2.2	1.5		18
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	0	0	0	0	0	0	0	0	0	0	0	0	0	30

[redacted]

HONOLULU, HAWAII (21°20'N., 157°56'W.) Elevation 7 ft. (2.1m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1015.0	1015.9	1016.9	1017.4	1017.1	1017.0	1016.6	1015.9	1015.1	1015.4	1015.6	1015.8	1016.2	34
TEMPERATURE (DEGREES F)														
MEAN	72.3	72.3	73.0	74.8	76.9	78.9	80.1	80.7	80.4	78.9	76.5	73.7	76.6	30
MEAN DAILY MAXIMUM	79.3	79.2	79.7	81.4	83.6	85.6	86.8	87.4	87.4	85.8	83.2	80.3	83.3	30
MEAN DAILY MINIMUM	65.3	65.3	66.3	68.1	70.2	72.2	73.4	74.0	73.4	72.0	69.8	67.1	69.8	30
EXTREME HIGHEST	85	85	87	87	88	90	90	91	92	91	89	85	92	6
EXTREME LOWEST	53	54	58	59	63	65	67	67	66	64	58	54	53	6
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (0800L)	80	77	75	70	67	66	65	67	66	68	74	78	71	6
AVERAGE PERCENTAGE (1400L)	64	60	61	59	55	54	51	54	52	55	60	61	57	6
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	5.5	5.7	6.0	6.3	6.0	5.6	5.3	5.3	5.1	5.6	5.7	5.6	5.6	29
MEAN NUMBER OF DAYS WITH CLEAR SKIES	9	8	8	6	7	8	8	8	9	8	7	8	92	26
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	10	9	10	11	10	7	6	6	6	8	9	10	102	26
PRECIPITATION														
MEAN AMOUNT (INCHES)	4.40	2.46	3.18	1.36	0.96	0.32	0.60	0.76	0.67	1.51	2.99	3.69	22.90	30
GREATEST AMOUNT (INCHES)	14.74	13.68	20.79	8.92	7.23	2.46	2.01	3.08	2.74	5.83	14.72	12.09	42.78	29
LEAST AMOUNT (INCHES)	0.48	0.48	0.01	0.01	0.05	*	0.03	*	0.07	0.11	0.03	0.39	9.97	29
MAXIMUM IN 24 HRS. (INCHES)	6.72	6.88	17.07	4.21	3.44	2.28	1.03	2.35	1.40	2.81	9.15	8.14	17.07	26
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	0	0	0	0	0	0	0	0	0	0	0	0	0	26
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	10	10	9	9	7	6	8	7	7	10	10	11	102	26
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	6.4	6.8	7.8	8.1	8.2	8.7	9.1	9.4	7.6	7.3	7.5	7.7		33
MEAN WIND SPEED (KNOTS) (1300L)	11.5	12.4	13.3	13.7	13.8	14.5	14.8	15.2	13.7	13.0	12.5	12.2		33
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	11.0	9.9	10.7	6.8	4.7	2.6	2.8	3.1	5.1	7.5	8.2	8.1		33
NORTH NORTHEAST	6.0	5.5	5.1	4.8	3.3	2.3	2.3	2.3	4.1	4.6	5.6	5.6		33
NORTHEAST	11.6	14.9	16.4	18.7	21.7	22.[illegible]	26.6	26.4	21.9	20.9	18.4	18.2		33
EAST NORTHEAST	13.4	17.8	23.1	29.2	31.5	36.5	37.1	38.2	32.3	26.9	25.6	22.4		33
EAST	8.3	8.4	14.3	16.1	17.1	21.8	20.0	19.7	15.3	13.1	10.4	10.3		33
EAST SOUTHEAST	1.9	1.4	2.0	1.9	2.2	2.4	2.1	1.7	2.1	1.6	2.0	1.9		33
SOUTHEAST	1.8	0.9	1.4	1.9	0.9	0.6	0.4	1.2	0.9	1.7	0.9	1.2		33
SOUTH SOUTHEAST	1.8	1.0	1.2	1.2	0.7	0.6	0.2	0.3	0.8	0.8	1.1	1.8		33
SOUTH	3.2	1.6	1.3	0.9	1.7	1.0	0.2	0.3	0.8	1.3	0.8	1.4		33
SOUTH SOUTHWEST	1.1	1.1	0.7	0.2	0.2	0.3	0.1	*	*	0.3	0.4	0.6		33
SOUTHWEST	2.1	1.3	1.2	0.2	0.4	0.2	0.1	0.1	0.2	0.3	0.2	1.1		33
WEST SOUTHWEST	1.0	0.6	0.3	0.1	0.3	0.1	0.1	0.2	0.1	*	0.2	0.5		33
WEST	2.1	2.0	1.1	0.7	0.2	0.3	0.4	0.1	0.5	0.9	0.9	1.4		33
WEST NORTHWEST	2.6	2.6	1.8	0.9	1.0	0.4	0.3	0.4	1.1	1.5	1.5	2.3		33
NORTHWEST	13.4	11.9	8.6	5.2	3.4	1.9	1.8	2.2	4.6	7.0	9.7	9.2		33
NORTH NORTHWEST	8.0	7.9	5.8	4.1	2.7	1.5	1.0	1.2	3.5	4.0	5.4	7.0		33
CALM	10.7	11.2	5.2	7.0	8.0	5.4	4.5	2.7	6.8	6.9	8.6	7.0		33
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	2.3	2.5	2.3	2.2	1.8	0.6	0.8	0.4	1.5	2.1	2.3	2.4		33
NORTH NORTHEAST	2.8	2.9	3.6	2.6	2.3	1.7	1.8	1.6	2.3	2.6	3.1	3.3		33
NORTHEAST	9.3	15.8	18.2	23.1	26.8	29.6	32.5	30.4	26.5	24.4	21.6	20.0		33
EAST NORTHEAST	14.6	[illegible]	27.1	32.9	36.0	37.8	40.2	44.3	37.3	31.5	33.7	26.7		33
EAST	8.3	[illegible]	12.6	13.2	13.2	18.4	17.3	18.8	12.9	13.5	9.2	10.7		33
EAST SOUTHEAST	2.3	2.0	1.3	1.0	1.1	1.7	1.1	0.9	1.4	1.0	1.3	1.3		33
SOUTHEAST	8.9	8.7	6.9	5.3	3.3	2.0	1.9	1.5	3.9	6.0	5.2	5.6		33
SOUTH SOUTHEAST	10.7	6.7	6.0	6.3	3.3	3.2	1.4	1.7	4.1	5.1	6.7	7.6		33
SOUTH	15.1	10.8	8.0	6.4	4.1	2.8	1.5	1.2	5.1	6.0	7.7	7.8		33
SOUTH SOUTHWEST	6.9	6.1	4.4	2.5	2.9	1.0	0.5	0.2	1.6	3.3	3.5	4.0		33
SOUTHWEST	7.6	5.4	4.1	1.6	2.2	0.8	0.3	0.6	0.9	2.1	2.2	4.2		33
WEST SOUTHWEST	3.1	2.1	1.5	0.5	0.3	0.1	0.1	0.1	0.2	0.9	0.5	1.4		33
WEST	2.6	1.4	1.0	0.2	0.4	*	*	*	0.2	0.3	0.4	1.4		33
WEST NORTHWEST	0.6	0.6	0.4	0.2	0.1	0.0	0.0	0.0	*	0.1	0.1	0.3		33
NORTHWEST	2.3	2.0	1.6	0.6	0.3	*	0.2	*	0.2	0.6	1.7	1.2		33
NORTH NORTHWEST	1.6	1.8	0.8	1.1	0.7	0.2	0.2	*	0.3	0.4	0.4	1.3		33
CALM	1.0	0.8	0.3	0.3	0.4	*	0.2	0.2	0.4	0.3	0.4	0.6		33
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	0	0	0	0	0	0	0	0	0	0	0	0	0	26

450

BEST DOCUMENT AVAILABLE

[redacted]

LIHUE, HAWAII (21°59'N., 159°21'W.) Elevation 103 ft. (31.4m)

WEATHER ELEMENTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR	YEARS OF RECORD
SEA LEVEL PRESSURE														
MEAN (MILLIBARS)	1015.8	1016.6	1017.3	1017.9	1018.1	1018.0	1017.3	1016.9	1015.8	1016.1	1016.3	1016.5	1016.9	18
TEMPERATURE (DEGREES F)														
MEAN	71.2	71.2	71.7	73.3	75.5	77.5	78.4	79.1	78.8	77.3	75.2	72.5	75.1	30
MEAN DAILY MAXIMUM	77.9	77.9	77.9	79.2	81.4	83.3	84.0	84.6	84.8	83.3	80.8	78.2	81.1	30
MEAN DAILY MINIMUM	64.4	64.4	65.4	67.3	69.5	71.7	72.7	73.6	72.8	71.3	69.6	66.8	69.1	30
EXTREME HIGHEST	84	86	87	87	88	89	88	89	89	90	86	85	90	25
EXTREME LOWEST	50	52	51	56	59	64	65	66	65	62	57	52	50	25
RELATIVE HUMIDITY														
AVERAGE PERCENTAGE (0800L)	83	81	79	77	75	74	75	76	77	79	80	81	78	26
AVERAGE PERCENTAGE (1400L)	68	67	67	68	67	65	65	66	65	68	70	69	67	26
CLOUD COVER														
AVERAGE AMOUNT (TENTHS)	6.1	6.2	6.7	7.2	6.8	6.5	6.5	6.5	5.8	6.3	6.7	6.4	6.5	26
MEAN NUMBER OF DAYS WITH CLEAR SKIES	7	6	4	3	3	3	3	3	5	5	4	5	51	25
MEAN NUMBER OF DAYS WITH CLOUDY SKIES	12	10	13	15	13	11	11	10	8	11	13	12	139	25
PRECIPITATION														
MEAN AMOUNT (INCHES)	6.24	4.28	4.67	3.25	2.43	1.57	1.87	2.21	1.85	3.84	5.63	6.34	44.18	30
GREATEST AMOUNT (INCHES)	17.70	14.66	14.94	18.28	22.27	5.63	8.85	8.13	4.86	14.77	18.45	22.91	72.13	40
LEAST AMOUNT (INCHES)	0.47	0.35	0.30	0.95	0.30	0.41	0.75	0.70	0.45	1.02	0.58	0.98	21.15	40
MAXIMUM IN 24 HRS. (INCHES)	11.09	7.28	6.37	6.52	4.06	2.17	5.04	5.43	2.51	7.85	11.20	11.54	11.54	25
MAXIMUM SNOWFALL IN 24 HRS. (INCHES)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26
MEAN NUMBER OF DAYS WITH SNOW (ONE INCH OR MORE)	0	0	0	0	0	0	0	0	0	0	0	0	0	26
0.01 INCH OR MORE, MEAN NUMBER OF DAYS	16	14	16	17	16	16	19	18	15	18	18	17	201	25
WIND														
MEAN WIND SPEED (KNOTS) (0700L)	8.6	9.1	9.2	9.8	10.1	10.2	10.5	10.4	8.9	8.7	9.3	9.3		18
MEAN WIND SPEED (KNOTS) (1300L)	10.7	11.3	11.4	11.7	11.8	11.6	11.8	11.8	11.1	10.7	11.1	10.9		18
DIRECTION (PERCENTAGE OF OBS.): AT 0700L														
NORTH	3.4	5.6	5.2	5.3	3.4	1.6	1.9	1.6	2.0	4.0	4.4	3.8		18
NORTH NORTHEAST	3.7	8.0	6.5	9.0	8.3	3.8	7.2	7.6	6.2	7.6	7.1	6.5		18
NORTHEAST	9.7	21.2	21.2	30.3	38.9	40.5	49.4	46.5	37.0	28.4	23.1	21.2		18
EAST NORTHEAST	14.9	13.4	17.7	23.7	28.5	36.3	32.4	31.6	27.0	19.4	19.4	14.7		18
EAST	3.4	3.8	5.4	3.5	5.1	4.3	3.1	3.2	3.3	5.4	4.5	6.1		18
EAST SOUTHEAST	0.9	0.7	1.9	0.7	0.5	0.5	0.4	0.3	0.2	0.5	1.1	1.9		18
SOUTHEAST	0.6	0.5	0.2	0.7	0.3	0.1	0.0	0.0	0.1	0.5	0.4	0.6		18
SOUTH SOUTHEAST	1.1	1.1	0.6	0.8	0.1	0.1	0.1	0.3	0.2	1.0	0.3	0.8		18
SOUTH	3.7	1.5	1.4	1.0	0.3	0.4	0.0	0.5	0.4	0.6	1.3	2.8		18
SOUTH SOUTHWEST	5.1	1.9	0.9	0.9	0.3	0.1	0.0	0.0	0.8	0.8	1.8	1.4		18
SOUTHWEST	6.4	4.1	2.4	1.0	0.5	0.4	0.1	0.3	1.2	1.2	2.7	3.2		18
WEST SOUTHWEST	10.9	7.6	5.8	3.5	0.8	1.7	0.1	0.5	3.1	4.6	6.0	6.2		18
WEST	23.7	18.6	16.6	8.9	6.1	5.3	1.7	2.9	9.3	13.8	13.6	17.7		18
WEST NORTHWEST	7.2	6.7	6.0	5.8	3.6	3.0	1.7	2.1	5.0	7.4	8.7	8.6		18
NORTHWEST	1.6	1.8	3.5	1.8	1.5	0.9	0.7	0.6	2.0	1.6	2.1	1.5		18
NORTH NORTHWEST	2.9	2.5	3.6	2.6	1.1	0.6	1.0	1.1	1.2	2.3	3.1	2.5		18
CALM	0.6	1.0	1.1	0.5	0.6	0.3	0.1	0.8	1.0	1.0	0.6	0.5		18
DIRECTION (PERCENTAGE OF OBS.): AT 1300L														
NORTH	3.2	3.3	3.7	3.3	1.6	0.1	0.6	0.6	0.8	3.2	4.7	4.3		18
NORTH NORTHEAST	8.6	11.7	13.1	11.3	8.7	6.1	8.5	6.7	9.3	13.3	13.2	12.1		18
NORTHEAST	19.1	33.5	29.2	42.4	50.2	50.1	59.2	55.8	44.9	30.3	12.2	29.9		18
EAST NORTHEAST	19.0	16.0	22.0	23.1	28.2	34.9	28.1	31.1	31.2	24.0	24.0	20.1		18
EAST	8.1	7.6	9.3	6.0	6.1	5.0	2.5	3.2	6.2	7.6	8.3	8.7		18
EAST SOUTHEAST	4.2	2.7	3.4	2.4	2.0	1.3	0.3	0.5	1.6	3.2	2.6	5.1		18
SOUTHEAST	3.6	2.4	1.9	1.9	0.9	0.6	0.0	0.8	0.5	2.3	2.1	2.5		18
SOUTH SOUTHEAST	6.4	4.4	3.6	3.3	1.0	0.8	0.3	0.3	1.6	2.9	3.7	3.8		18
SOUTH	11.3	5.1	4.6	4.0	1.1	0.1	0.4	0.3	2.5	2.7	4.7	4.3		18
SOUTH SOUTHWEST	5.1	4.2	1.3	0.3	0.1	0.1	0.0	0.1	0.7	0.8	1.3	2.8		18
SOUTHWEST	7.3	3.9	1.5	0.5	0.1	0.0	0.0	0.1	0.1	1.4	2.3	3.6		18
WEST SOUTHWEST	1.9	2.3	1.4	0.1	0.1	0.0	0.0	0.0	0.1	0.5	0.9	0.6		18
WEST	0.5	0.5	0.5	0.3	0.0	0.0	0.0	0.1	0.0	0.1	0.4	0.2		18
WEST NORTHWEST	0.4	0.8	0.2	0.3	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2		18
NORTHWEST	0.4	0.5	0.9	0.1	0.1	0.1	0.0	0.1	0.2	0.3	0.2	0.1		18
NORTH NORTHWEST	0.8	0.7	1.0	0.6	0.0	0.0	0.1	0.0	0.4	1.0	1.1	1.4		18
CALM	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1		18
VISIBILITY														
DAYS WITH VISIBILITY EQUAL TO OR LESS THAN 1/4 MILE	0	0	0	0	0	0	0	0	0	0	0	0	0	26

METEOROLOGICAL TABLE FOR COASTAL AREA OFF SAN DIEGO

Boundaries: Between 31°N., and 34°N., and from 120°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	*	*	*	*	*	*	*	*	*	*	*	*	*
Wave height ≧ 10 feet (1)	1.4	1.8	2.3	1.2	1.3	.9	.6	*	1.0	1.3	3.0	2.5	1.3
Visibility < 2 naut. mi. (1)	3.6	3.8	2.0	2.7	1.1	2.6	2.0	1.7	2.8	3.8	2.7	4.7	2.8
Precipitation (1)	3.7	3.0	2.1	1.8	1.0	1.5	.6	*	.9	.8	3.0	3.7	1.8
Temperature ≧ 85°F (1)	0	0	0	0	0	0	*	*	*	*	*	*	*
Mean Temperature (°F)	58.1	58.0	58.1	59.0	60.1	61.4	63.7	65.7	66.0	64.8	62.1	59.9	61.4
Temperature ≦ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	76	75	76	77	78	81	85	84	82	81	78	78	80
Sky overcast or obscured (1)	20.0	21.6	21.4	27.7	37.1	49.0	46.2	41.8	28.1	29.0	19.9	20.7	30.3
Mean cloud cover (eighths)	3.7	3.6	4.0	4.3	4.9	5.6	5.5	5.4	4.1	4.1	3.6	3.7	4.4
Mean sea-level pressure (2)	1019	1018	1017	1016	1015	1013	1013	1014	1012	1015	1017	1017	1016
Extreme max. sea-level pressure (2)	1032	1032	1031	1027	1026	1025	1027	1027	1022	1028	1030	1031	1032
Extreme min. sea-level pressure (2)	997	997	1000	999	1001	999	1001	991	999	998	1005	999	991
Prevailing wind direction	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
Thunder and lightning (1)	*	*	*	*	*	*	*	*	*	*	*	0	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF POINT MUGU

Boundaries: Between 34°N., and 36°N., and from 125°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	*	.6	.9	1.1	.8	.9	*	*	*	.6	*	*	.6
Wave height ≧ 10 feet (1)	7.5	7.8	10.7	16.2	11.5	8.6	5.0	5.2	3.3	7.1	8.5	9.7	8.0
Visibility < 2 naut. mi. (1)	2.2	7.0	4.4	8.3	8.1	6.5	10.6	11.7	10.7	14.1	6.6	4.5	8.1
Precipitation (1)	8.5	7.1	4.8	3.8	2.3	2.3	2.0	1.7	1.4	1.3	4.0	6.3	3.6
Temperature ≧ 85°F (1)	0	0	0	0	0	0	0	0	*	*	*	0	*
Mean Temperature (°F)	56.1	55.7	56.1	56.9	58.1	60.4	62.2	63.1	63.5	62.3	60.2	58.5	59.5
Temperature ≦ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	73	76	77	80	81	83	85	85	83	81	75	73	80
Sky overcast or obscured (1)	18.8	22.8	20.2	31.0	31.0	35.8	46.4	44.3	34.2	31.3	20.4	19.4	30.3
Mean cloud cover (eighths)	3.7	3.6	3.6	4.3	4.1	4.2	5.0	4.8	4.1	3.9	3.5	3.6	4.1
Mean sea-level pressure (2)	1019	1019	1018	1017	1016	1014	1014	1014	1013	1015	1018	1018	1016
Extreme max. sea-level pressure (2)	1034	1033	1033	1032	1028	1027	1024	1029	1023	1026	1030	1032	1034
Extreme min. sea-level pressure (2)	998	998	993	1000	1004	994	996	1000	999	996	999	999	993
Prevailing wind direction	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
Thunder and lightning (1)	*	0	0	*	*	0	*	*	*	0	*	*	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF SAN FRANCISCO

Boundaries: Between 36°N., and 38°N., and from 126°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	1.5	2.5	1.9	2.4	2.5	1.9	.8	*	1.1	1.7	1.4	2.7	1.7
Wave height ≧ 10 feet (1)	15.6	13.1	16.4	22.2	18.3	8.7	7.9	4.9	6.2	10.7	14.9	16.0	12.5
Visibility < 2 naut. mi. (1)	5.2	6.5	2.0	2.7	3.0	5.0	5.0	4.4	4.1	6.9	6.3	6.4	4.8
Precipitation (1)	9.9	6.9	7.6	4.5	3.2	3.5	3.2	2.7	2.4	2.9	5.4	8.0	4.9
Temperature ≧ 85°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Temperature (°F)	53.0	53.4	53.3	53.7	55.2	57.3	58.6	60.1	60.9	59.8	57.6	55.4	56.6
Temperature ≦ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	82	82	80	81	82	86	87	88	86	84	83	81	84
Sky overcast or obscured (1)	33.2	29.4	28.2	28.9	32.5	37.3	54.3	45.1	34.0	29.2	27.7	28.3	34.5
Mean cloud cover (eighths)	4.9	4.6	4.7	4.5	4.7	4.6	5.4	4.9	4.3	3.9	4.5	4.5	4.6
Mean sea-level pressure (2)	1020	1020	1019	1018	1018	1016	1016	1016	1015	1017	1019	1020	1018
Extreme max. sea-level pressure (2)	1038	1036	1033	1032	1032	1029	1032	1029	1024	1030	1034	1037	1038
Extreme min. sea-level pressure (2)	990	987	994	999	1002	997	999	1001	1000	996	996	996	987
Prevailing wind direction	NNW	NNW	NW	NNW	NNW	NW	NNW	NW	NNW	NNW	NNW	NNW	NNW
Thunder and lightning (1)	*	*	0	*	*	*	*	0	*	0	*	*	*

(1) Percentage frequency.
(2) Millibars.
* 0.0-0.5%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

METEOROLOGICAL TABLE FOR COASTAL AREA OFF POINT ARENA

Boundaries: Between 38°N., and 40°N., and from 127°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≥ 34 knots (1)	3.4	3.0	2.0	3.1	5.6	4.4	2.6	2.5	1.8	2.0	1.7	2.1	2.9
Wave height ≥ 10 feet (1)	20.8	15.7	18.3	18.1	27.9	15.4	9.4	13.3	5.9	9.5	14.2	16.6	15.2
Visibility < 2 naut. mi. (1)	6.5	5.9	3.2	3.0	1.9	3.4	7.0	6.6	5.8	7.6	5.5	4.8	5.0
Precipitation (1)	13.4	11.4	11.6	6.1	4.1	2.5	3.0	2.3	2.2	4.6	10.7	11.6	6.3
Temperature ≥ 85°F (1)	0	0	0	0	0	0	0	*	*	0	0	0	*
Mean Temperature (°F)	52.2	53.0	52.9	53.0	54.8	57.2	59.0	60.5	60.4	58.8	57.4	54.2	56.5
Temperature ≤ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	80	79	78	80	82	83	84	84	85	84	81	81	82
Sky overcast or obscured (1)	34.9	32.0	30.3	29.6	26.0	31.2	42.1	33.7	32.2	25.7	31.3	31.9	32.0
Mean cloud cover (eighths)	5.0	4.7	4.8	4.6	4.3	4.3	4.8	4.4	4.1	3.7	4.7	4.8	4.5
Mean sea-level pressure (2)	1020	1020	1019	1018	1018	1016	1016	1016	1015	1017	1019	1019	1017
Extreme max. sea-level pressure (2)	1036	1036	1037	1031	1031	1032	1030	1030	1027	1028	1033	1036	1037
Extreme min. sea-level pressure (2)	992	993	995	996	1004	996	999	1002	1004	988	994	992	988
Prevailing wind direction	N	NNW	NW	NNW	NNW	NNW	NNW	NNW	NNW	NNW	N	NNW	NNW
Thunder and lightning (1)	*	*	*	*	*	*	*	0	0	*	*	0	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF EUREKA

Boundaries: Between 40°N., and 42°N., and from 127°W., to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≥ 34 knots (1)	4.8	2.7	2.1	3.3	2.8	3.5	2.4	2.4	4.3	3.7	3.6	4.6	3.3
Wave height ≥ 10 feet (1)	34.6	15.6	22.6	16.3	26.2	13.0	3.3	5.4	5.9	12.2	23.3	30.8	16.4
Visibility < 2 naut. mi. (1)	2.3	5.4	3.4	3.2	3.2	4.5	13.0	8.4	9.5	9.4	7.0	3.3	6.3
Precipitation (1)	14.9	10.2	12.1	7.1	3.7	2.0	1.9	2.8	1.2	6.8	13.9	10.5	6.7
Temperature ≥ 85°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Temperature (°F)	50.5	50.7	51.1	51.7	53.9	56.7	57.5	59.6	58.7	57.3	54.7	52.8	54.9
Temperature ≤ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	80	82	80	81	83	85	86	87	87	84	85	82	84
Sky overcast or obscured (1)	35.9	36.3	34.9	35.3	36.9	32.0	47.0	37.5	26.8	29.7	32.6	28.9	35.2
Mean cloud cover (eighths)	5.4	5.1	5.2	5.1	4.9	4.4	4.9	4.4	3.6	4.1	4.9	5.2	4.8
Mean sea-level pressure (2)	1019	1019	1018	1019	1018	1017	1017	1018	1016	1018	1017	1019	1018
Extreme max. sea-level pressure (2)	1036	1034	1034	1032	1030	1027	1027	1026	1026	1032	1031	1038	1038
Extreme min. sea-level pressure (2)	986	994	996	992	998	992	1008	1008	998	987	990	991	987
Prevailing wind direction	N	N	N	N	N	N	N	N	N	N	N	N	N
Thunder and lightning (1)	*	.9	0	*	0	0	*	0	*	*	*	0	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF NORTH BEND

Boundaries: Between 42°N., and 44°N., and from 127°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≥ 34 knots (1)	6.9	3.9	2.8	1.8	1.3	3.5	2.8	1.0	2.2	2.3	5.0	4.3	3.1
Wave height ≥ 10 feet (1)	28.0	25.6	31.2	6.4	15.7	11.6	10.2	1.4	3.5	15.0	20.4	36.6	16.1
Visibility < 2 naut. mi. (1)	3.4	4.1	1.6	4.1	1.9	2.9	5.3	9.9	6.9	5.7	6.4	4.7	4.5
Precipitation (1)	18.6	17.6	15.8	7.4	7.8	5.0	3.9	4.3	3.1	8.4	20.3	16.3	10.5
Temperature ≥ 85°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Temperature (°F)	49.1	49.6	49.6	50.8	53.1	56.7	58.6	59.7	59.0	56.6	54.2	51.3	54.1
Temperature ≤ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	82	82	81	81	82	84	86	87	85	85	85	81	83
Sky overcast or obscured (1)	40.7	45.6	32.6	36.7	31.4	32.7	32.6	30.9	27.7	29.3	45.0	33.0	34.8
Mean cloud cover (eighths)	5.5	5.7	5.3	5.3	5.0	5.0	4.7	4.3	4.0	4.4	5.6	5.3	5.0
Mean sea-level pressure (2)	1018	1019	1017	1019	1019	1018	1018	1018	1017	1016	1017	1017	1018
Extreme max. sea-level pressure (2)	1036	1037	1034	1032	1031	1027	1038	1028	1033	1033	1034	1039	1039
Extreme min. sea-level pressure (2)	986	988	994	994	1003	1002	1008	1008	1004	979	984	984	984
Prevailing wind direction	S	S	S	N	N	N	N	N	N	N	S	S	N
Thunder and lightning (1)	0	0	0	0	0	0	*	0	*	*	*	0	*

(1) Percentage frequency.
(2) Millibars.
* 0.0-0.5%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

METEOROLOGICAL TABLE FOR COASTAL AREA OFF NEWPORT

Boundaries: Between 44°N., and 46°N., and from 127°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	5.4	2.1	3.3	1.2	*	*	1.0	0	*	2.2	4.0	7.9	2.3
Wave height ≧ 10 feet (1)	29.6	24.7	21.4	6.4	7.6	6.6	2.5	2.8	8.7	14.3	20.8	31.1	14.8
Visibility < 2 naut. mi. (1)	3.6	7.2	3.5	2.6	2.8	3.7	1.8	2.3	5.7	8.7	4.4	1.9	3.8
Precipitation (1)	21.7	18.3	15.1	10.0	7.5	5.9	4.7	7.6	5.9	12.6	16.0	17.2	11.9
Temperature ≧ 85°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Temperature (°F)	47.6	48.0	48.2	49.6	53.0	57.2	60.2	61.1	60.2	57.1	53.3	49.9	53.7
Temperature ≦ 32°F (1)	*	0	0	0	0	0	0	0	0	0	0	0	*
Mean relative humidity (%)	82	83	81	80	80	81	82	84	84	83	82	82	82
Sky overcast or obscured (1)	47.9	47.1	42.7	37.9	33.7	44.8	38.5	39.2	28.6	36.3	41.2	39.4	40.0
Mean cloud cover (eighths)	6.0	5.8	5.8	3.5	5.4	6.1	5.6	5.3	4.5	5.1	5.7	5.6	5.6
Mean sea-level pressure (2)	1017	1018	1016	1018	1019	1018	1020	1019	1017	1018	1016	1015	1018
Extreme max. sea-level pressure (2)	1038	1037	1035	1033	1032	1034	1028	1028	1030	1032	1033	1036	1038
Extreme min. sea-level pressure (2)	987	985	989	992	1000	998	1007	1004	999	981	990	983	981
Prevailing wind direction	S	S	S	N	N	N	N	N	N	S	S	S	N
Thunder and lightning (1)	0	*	0	*	0	0	*	*	*	*	.6	*	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF ASTORIA

Boundaries: Between 46°N., and 48°N., and from 127°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	6.3	5.5	2.9	3.1	*	*	0	0	*	2.6	4.8	6.0	2.6
Wave height ≧ 10 feet (1)	35.4	32.6	32.1	11.9	10.9	4.7	1.4	2.4	4.7	19.7	18.5	39.3	16.2
Visibility < 2 naut. mi. (1)	3.6	4.2	3.0	2.6	2.9	2.0	2.3	4.1	5.5	5.7	4.4	4.3	3.7
Precipitation (1)	23.6	21.2	17.9	12.6	10.5	8.7	8.2	7.2	8.8	13.9	24.1	21.1	14.8
Temperature ≧ 85°F (1)	0	0	0	0	0	0	*	*	0	0	0	0	*
Mean Temperature (°F)	45.0	46.4	46.5	48.9	52.7	56.6	60.5	61.0	59.7	56.0	50.7	47.9	52.8
Temperature ≦ 32°F (1)	2.5	*	*	0	0	0	0	0	0	0	0	*	*
Mean relative humidity (%)	81	84	80	81	81	82	80	83	83	82	82	82	82
Sky overcast or obscured (1)	47.7	48.3	42.8	36.5	41.1	45.6	44.4	34.7	32.9	39.6	50.1	45.4	42.3
Mean cloud cover (eighths)	5.9	6.1	5.9	5.5	5.7	6.0	5.4	5.4	4.7	5.6	6.0	6.0	5.7
Mean sea-level pressure (2)	1015	1017	1015	1017	1019	1018	1019	1018	1017	1016	1016	1015	1017
Extreme max. sea-level pressure (2)	1040	1037	1037	1036	1034	1030	1034	1030	1032	1034	1037	1038	1040
Extreme min. sea-level pressure (2)	980	982	986	986	1003	994	1002	1004	995	991	988	968	968
Prevailing wind direction	S	S	S	NW	NW	NW	NW	NW	N	S	S	S	NW
Thunder and lightning (1)	0	*	0	*	*	0	0	*	*	*	*	*	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF SEATTLE

Boundaries: Between 48°N., and 50°N., and from 129°W., eastward to coast

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	4.3	3.3	2.3	1.6	1.1	*	*	*	1.0	2.2	3.3	2.9	1.9
Wave height ≧ 10 feet (1)	11.1	26.0	20.4	17.6	6.3	4.6	4.5	2.4	6.4	24.6	15.0	22.1	12.6
Visibility < 2 naut. mi. (1)	5.6	4.7	3.7	1.9	2.7	3.7	6.2	8.0	6.2	6.4	6.5	4.0	5.1
Precipitation (1)	28.7	25.0	19.6	17.1	14.8	11.5	10.2	6.2	12.9	19.2	29.2	28.8	18.1
Temperature ≧ 85°F (1)	0	0	0	0	0	0	0	0	*	0	0	0	*
Mean Temperature (°F)	43.6	44.9	45.5	48.3	52.0	56.3	59.4	60.6	58.1	54.0	48.6	45.7	52.0
Temperature ≦ 32°F (1)	3.6	1.0	*	*	0	0	0	0	0	0	1.2	.8	.6
Mean relative humidity (%)	81	83	80	81	80	80	81	83	81	82	81	83	81
Sky overcast or obscured (1)	52.2	49.8	39.5	42.2	40.8	38.0	38.8	38.9	35.2	40.3	45.6	51.3	42.4
Mean cloud cover (eighths)	6.2	6.0	5.5	5.7	5.7	5.7	5.1	5.3	4.9	5.5	6.0	6.3	5.7
Mean sea-level pressure (2)	1014	1015	1015	1017	1017	1017	1019	1018	1017	1015	1016	1014	1016
Extreme max. sea-level pressure (2)	1041	1041	1039	1033	1035	1031	1034	1030	1037	1038	1041	1042	1042
Extreme min. sea-level pressure (2)	980	974	984	978	991	984	997	998	983	977	975	974	974
Prevailing wind direction	SE	S	W	NW	NW	NW	NW	NW	NW	NW	SE	S	NW
Thunder and lightning (1)	*	0	*	*	0	*	*	*	*	*	*	*	*

(1) Percentage frequency.

(2) Millibars.

0.0-0.5%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

METEOROLOGICAL TABLE FOR COASTAL AREA OFF HAWAIIAN (WINDWARD) ISLANDS

Boundaries: Central position 20°54'N., 156°00'W.

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	1.0	1.0	.7	*	0	*	0	*	0	*	.6	1.2	*
Wave height ≧ 10 feet (1)	10.6	13.3	11.8	7.3	4.1	2.7	2.6	2.2	2.2	5.8	10.3	14.9	7.2
Visibility < 2 naut. mi. (1)	.9	*	*	*	*	*	0	*	*	*	*	*	*
Precipitation (1)	6.5	8.2	6.3	12.6	6.9	15.9	6.2	8.2	4.6	4.1	5.0	4.2	7.4
Temperature ≧ 85°F (1)	.6	*	*	*	1.0	1.9	3.3	4.5	2.5	3.4	1.1	.9	1.7
Mean Temperature (°F)	74.1	73.4	73.3	73.7	75.6	76.5	77.8	78.5	78.5	78.2	76.8	75.0	76
Temperature ≦ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	78	78	78	78	77	77	78	78	75	76	78	78	77
Sky overcast or obscured (1)	11.6	16.6	14.8	12.1	8.6	6.6	6.5	6.1	5.4	7.6	10.7	12.7	9.9
Mean cloud cover (eighths)	3.9	4.3	4.4	4.4	4.2	4.1	4.2	4.0	3.8	3.9	4.2	4.1	4.1
Mean sea-level pressure (2)	1015	1016	1017	1017	1017	1017	1017	1016	1016	1016	1016	1016	1017
Extreme max. sea-level pressure (2)	1028	1026	1026	1027	1028	1025	1026	1022	1021	1022	1024	1024	1028
Extreme min. sea-level pressure (2)	1000	1001	1002	1002	1002	1002	1002	1006	1008	1007	1006	1002	1000
Prevailing wind direction	E	E	E	E	E	E	E	E	E	E	E	E	E
Thunder and lightning (1)	*	*	.6	*	*	0	*	*	*	*	*	*	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF HAWAIIAN (LEEWARD) ISLANDS

Boundaries: Central position 20°18'N., 158°12'W.

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	*	*	*	*	*	*	*	*	0	*	*	.8	*
Wave height ≧ 10 feet (1)	7.3	5.9	5.3	5.8	4.3	1.4	1.5	2.3	2.0	3.4	5.4	11.8	4.7
Visibility < 2 naut. mi. (1)	*	.7	*	*	*	*	*	*	*	*	*	*	*
Precipitation (1)	7.3	8.1	6.2	8.6	7.7	6.0	5.4	4.8	4.5	6.9	6.6	8.0	6.7
Temperature ≧ 85°F (1)	1.7	.8	*	*	2.9	3.1	4.4	4.7	5.8	4.0	2.0	1.2	2.6
Mean Temperature (°F)	75.0	74.6	74.5	75.4	77.0	78.4	79.2	79.7	79.9	79.2	77.9	76.2	77.4
Temperature ≦ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	76	76	77	77	76	76	76	75	75	76	76	76	76
Sky overcast or obscured (1)	9.8	12.9	13.2	12.9	6.5	3.9	4.2	4.5	4.5	7.8	8.4	12.4	8.4
Mean cloud cover (eighths)	3.6	3.8	4.0	4.3	4.0	3.7	3.6	3.5	3.5	3.8	3.9	3.9	3.6
Mean sea-level pressure (2)	1015	1016	1016	1017	1017	1017	1016	1016	1015	1015	1015	1015	1016
Extreme max. sea-level pressure (2)	1031	1030	1034	1027	1029	1027	1027	1032	1029	1031	1027	1031	1034
Extreme min. sea-level pressure (2)	1000	1000	1001	1002	988	999	1000	1000	998	1000	999	998	988
Prevailing wind direction	E	E	NE	NE	E	E	E	E	E	E	E	NE	E
Thunder and lightning (1)	.7	.7	.7	*	*	*	*	*	*	.6	1.0	.7	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF BARKING SANDS

Boundaries: Central position 22°42'N., 160°18'W.

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≧ 34 knots (1)	*	*	*	0	0	0	*	*	0	*	.8	.9	*
Wave height ≧ 10 feet (1)	16.1	15.1	13.3	11.8	5.7	6.0	7.8	4.5	2.9	6.1	21.7	24.6	11.3
Visibility < 2 naut. mi. (1)	0	.6	0	*	0	*	*	*	0	*	*	*	*
Precipitation (1)	5.6	4.5	5.6	5.0	3.1	2.9	2.4	4.2	2.2	4.8	5.5	6.7	4.4
Temperature ≧ 85°F (1)	.6	0	.6	*	.6	1.1	1.6	2.0	2.9	1.1	1.3	*	1.0
Mean Temperature (°F)	72.8	72.4	72.6	73.1	75.0	76.8	77.8	78.5	78.9	77.8	76.5	74.3	75.8
Temperature ≦ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	78	76	77	77	78	80	79	79	78	76	78	78	78
Sky overcast or obscured (1)	15.0	16.7	13.5	13.9	11.5	4.7	5.0	4.5	4.6	9.6	11.7	14.8	10.5
Mean cloud cover (eighths)	4.1	4.2	4.0	4.6	4.3	3.8	4.0	4.1	3.6	4.0	4.1	4.1	4.1
Mean sea-level pressure (2)	1015	1017	1018	1018	1018	1018	1018	1017	1016	1016	1016	1016	1017
Extreme max. sea-level pressure (2)	1026	1028	1031	1026	1027	1028	1025	1023	1023	1024	1024	1026	1031
Extreme min. sea-level pressure (2)	1001	1002	1008	1009	1010	1010	1010	1007	1009	1006	1004	1002	1001
Prevailing wind direction	E	E	E	E	E	E	E	E	E	E	E	E	E
Thunder and lightning (1)	.6	.7	*	*	*	*	0	*	*	0	.8	.6	*

(1) Percentage frequency.
(2) Millibars.
0.0-0.5%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

[redacted]

METEOROLOGICAL TABLE FOR COASTAL AREA OFF FRENCH FRIGATE SHOALS

Boundaries: Central position 23°36'N., 166°30'W.

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≥ 34 knots (1)	.6	.9	*	.9	0	0	*	0	0	0	.7	1.6	*
Wave height ≥ 10 feet (1)	18.2	14.8	14.8	11.9	7.1	3.2	6.7	1.4	2.1	5.5	12.1	21.9	10.0
Visibility < 2 naut. mi. (1)	.9	1.1	0	0	*	0	0	*	0	*	1.4	*	*
Precipitation (1)	3.4	7.6	5.6	4.1	4.7	2.4	3.6	3.5	4.5	5.9	4.6	4.3	4.8
Temperature ≥ 85°F (1)	0	0	0	0	.6	3.1	3.3	4.3	*	2.2	0	*	1.4
Mean Temperature (°F)	72.1	71.3	71.4	72.8	74.9	79.9	78.8	79.5	79.1	78.4	76.4	73.6	75.6
Temperature ≤ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	76	77	77	77	80	79	77	79	78	77	77	76	78
Sky overcast or obscured (1)	14.8	17.9	17.8	16.1	13.7	4.5	4.3	8.1	5.2	9.6	13.0	14.2	11.6
Mean cloud cover (eighths)	4.2	4.4	4.6	4.7	4.5	3.8	4.0	4.1	3.7	4.2	4.2	4.3	4.2
Mean sea-level pressure (2)	1014	1016	1018	1019	1018	1018	1018	1017	1017	1016	1016	1016	1017
Extreme max. sea-level pressure (2)	1029	1027	1026	1026	1025	1024	1023	1026	1022	1022	1025	1026	1029
Extreme min. sea-level pressure (2)	1000	1004	1006	1001	1009	1010	1012	1007	1009	1007	1003	1001	1000
Prevailing wind direction	E	E	E	E	E	E	E	E	E	E	E	E	E
Thunder and lightning (1)	*	0	*	0	*	0	*	0	*	*	1.0	*	*

METEOROLOGICAL TABLE FOR COASTAL AREA OFF MIDWAY ISLAND

Boundaries: Central position 28°00'N., 177°06'W.

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Wind ≥ 34 knots (1)	2.9	3.0	2.5	.8	0	0	*	0	*	*	1.1	3.6	1.2
Wave height ≥ 10 feet (1)	25.0	30.2	16.9	8.7	1.6	1.8	1.3	3.1	5.6	9.6	16.2	25.6	12.0
Visibility < 2 naut. mi. (1)	*	*	0	0	0	1.2	*	0	0	*	1.0	*	*
Precipitation (1)	8.8	8.6	8.9	9.0	6.7	10.8	8.0	7.7	10.9	6.7	9.4	8.7	8.7
Temperature ≥ 85°F (1)	0	0	*	0	0	5.5	8.8	10.8	9.3	2.7	.9	0	3.3
Mean Temperature (°F)	67.8	67.0	68.4	69.7	72.5	77.1	79.5	80.3	79.9	77.0	73.9	70.6	73.5
Temperature ≤ 32°F (1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean relative humidity (%)	77	77	79	80	79	81	80	80	77	77	78	79	79
Sky overcast or obscured (1)	21.5	23.6	22.2	21.4	13.1	16.6	4.3	6.8	10.0	11.9	16.5	18.7	15.5
Mean cloud cover (eighths)	4.8	5.0	4.9	5.0	4.7	4.4	3.8	4.1	4.3	4.5	4.7	4.9	4.6
Mean sea-level pressure (2)	1015	1016	1019	1021	1019	1018	1020	1019	1017	1018	1017	1017	1018
Extreme max. sea-level pressure (2)	1029	1031	1032	1033	1030	1026	1025	1025	1024	1025	1029	1035	1035
Extreme min. sea-level pressure (2)	992	1000	999	1006	1006	1003	1010	1006	1004	1002	1005	988	988
Prevailing wind direction	W	NW	E	E	E	E	E	E	E	E	NE	E	E
Thunder and lightning (1)	.8	0	0	0	0	0	1.4	0	.8	*	0	0	*

(1) Percentage frequency.
(2) Millibars.
* 0.0-0.5%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

456

BEST DOCUMENT AVAILABLE

MEAN SURFACE WATER TEMPERATURES (T) AND DENSITIES (D)

Stations	Years	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec		Mean	
		(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}
La Jolla, Calif. 32°52'N., 117°15'W.	56	13.9	24.9	13.9	24.8	14.4	24.8	15.4	24.9	16.9	25.0	18.4	25.0	19.9	25.0	20.8	25.0	19.3	24.9	18.0	24.9	16.3	24.9	14.9	24.9	16.8	24.9
Newport Bay, Calif. 33°36'N., 117°53'W.	17	14.0	24.4	14.5	24.4	15.4	24.5	16.6	24.5	17.7	24.9	19.0	25.0	20.3	25.0	21.2	25.0	19.9	25.0	18.7	24.9	16.4	24.6	14.7	24.5	17.4	24.7
Los Angeles (Outer Harbor), Calif. 33°43'N., 118°16'W.	49	13.9	24.7	14.2	24.6	14.7	24.8	15.4	24.9	16.2	25.1	17.7	25.1	18.9	25.1	19.7	25.1	19.0	25.1	18.1	25.0	16.5	24.9	14.8	24.8	16.6	24.9
Santa Monica, Calif. 34°00'N., 118°30'W.	27	13.5	24.9	13.7	24.9	13.9	25.0	14.7	25.0	15.7	25.2	17.5	25.2	19.2	25.2	19.9	25.2	19.0	25.1	17.6	25.0	15.7	25.0	14.3	24.9	16.2	25.0
Avila Beach, Calif. 35°10'N., 120°44'W.	27	12.4	24.5	12.5	24.4	12.3	24.7	12.5	24.9	13.1	25.2	14.1	25.4	15.4	25.4	15.9	25.3	15.7	25.2	15.0	25.1	13.9	24.9	12.8	24.8	13.8	25.0
Pacific Grove, Calif. 36°37'N., 121°54'W.	51	11.8	24.7	12.0	24.6	12.2	24.6	12.4	24.7	12.8	24.9	13.4	25.0	13.8	25.0	13.9	25.0	14.2	25.0	13.7	24.9	12.9	24.8	12.4	24.8	13.0	24.8
San Francisco (Ft. Point), Calif. 37°48'N., 122°28'W.	51	10.4	21.1	10.9	20.0	11.6	19.9	12.4	20.0	13.1	20.7	13.9	21.5	14.7	22.9	15.2	23.7	15.5	23.8	14.8	23.8	13.0	23.2	11.2	22.4	13.1	21.9
Alameda, Calif. 37°47'N., 122°18'W.	33	10.3	17.3	11.9	15.6	13.9	15.7	16.1	16.5	17.8	17.6	19.4	18.7	20.5	20.5	20.5	21.8	20.2	22.4	17.7	21.9	14.4	21.1	11.4	19.5	16.2	19.0
Crescent City, Calif. 41°45'N., 124°12'W.	37	9.6	20.8	9.9	20.7	10.2	21.1	10.7	21.8	11.5	22.6	12.5	23.3	13.6	24.0	14.3	24.1	13.5	24.2	12.1	24.0	11.2	22.8	10.2	21.8	11.7	22.6
Astoria (Tongue Pt.), Oreg. 46°13'N., 123°46'W.	48	4.7	0.1	5.4	-0.2	7.4	-0.5	10.5	-0.7	13.4	-0.7	15.8	-0.6	18.6	-0.5	19.3	-0.2	17.5	0.4	14.0	1.0	9.4	0.9	6.2	0.5	11.8	0.0
Neah Bay, Wash. 48°22'N., 124°37'W.	37	7.3	22.4	7.4	22.2	7.9	22.5	9.1	22.7	10.6	23.2	11.6	23.2	11.8	23.7	11.6	23.9	11.3	23.8	10.6	23.4	9.4	22.9	8.2	22.5	9.7	23.0
Seattle (Elliott Bay), Wash. 47°36'N., 122°20'W.	50	8.6	20.4	8.2	20.0	8.2	19.9	8.9	19.5	10.3	19.5	11.9	19.9	13.1	20.7	13.4	21.4	13.0	21.8	12.2	21.8	10.8	21.5	9.6	20.9	10.7	20.6
Hilo, Hawaii 19°44'N., 155°03'W.	26	22.3	19.6	22.2	19.2	22.1	19.0	22.2	17.6	22.7	18.2	23.3	18.9	23.7	18.5	23.9	18.6	24.2	19.2	24.1	19.5	23.5	19.3	22.7	18.9	23.1	18.9
Honolulu, Hawaii 21°18'N., 157°52'W.	28	24.4	25.4	24.3	25.6	24.3	25.6	24.7	25.8	25.4	25.8	26.0	25.8	26.4	25.9	26.8	25.9	26.9	25.9	26.9	25.9	26.1	25.8	25.0	25.7	25.6	25.8
Kaneohe Bay, Hawaii 21°26'N., 157°48'W.	16	22.7	25.3	22.7	25.4	23.3	25.1	23.8	25.3	25.1	25.4	26.2	25.9	26.3	25.9	26.6	26.0	26.7	26.0	26.2	25.9	24.7	25.6	23.1	25.4	24.8	25.6
Midway Islands 28°13'N., 177°22'W.	28	19.7	26.4	19.5	26.4	20.1	26.5	21.0	26.5	22.7	26.6	25.1	26.7	26.4	26.7	26.9	26.6	26.9	26.6	25.1	26.5	23.2	26.5	21.3	26.4	23.2	26.5

F (Fahrenheit) = 1.8C (Celsius) + 32

Density as used in this table is the specific gravity of the sea water or the ratio between the weight of a sea-water sample and the weight of an equal volume of distilled water at 15°C (59°F). These figures representing density at 15°C (ρ_{15}) are expressed in terms of sigma-t (σ_t) where t = 15°C and σ_{15} = (ρ_{15} − 1) 1000. Thus, for ρ_{15} = 1.0238, σ_{15} = 23.8. Obtain the pamphlet, "Surface Water Temperature and Density, Pacific Coast, North and South America and Pacific Ocean Islands. NOS Publication 31-3," for greater detail; for sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

DETERMINATION OF WIND SPEED BY SEA CONDITION

Miles per hour	Knots	Descriptive	Sea Conditions	Wind force (Beaufort)	Probable wave height (in ft.)
0-1	0-1	Calm	Sea smooth and mirror-like.	0	-
1-3	1-3	Light air	Scale-like ripples without foam crests.	1	1/4
4-7	4-6	Light breeze	Small, short wavelets; crests have a glassy appearance and do not break.	2	1/2
8-12	7-10	Gentle breeze	Large wavelets; some crests begin to break; foam of glassy appearance. Occasional white foam crests.	3	2
13-18	11-16	Moderate breeze	Small waves, become longer; fairly frequent white foam crests.	4	4
19-24	17-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many white foam crests; there may be some spray.	5	6
25-31	22-27	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere; there may be some spray.	6	10
32-38	28-33	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind; spindrift begins.	7	14
39-46	34-40	Gale	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind.	8	18
47-54	41-47	Strong gale	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble, and roll over; spray may reduce visibility.	9	23
55-63	48-55	Storm	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea is white in appearance. The tumbling of the sea becomes heavy and shocklike. Visibility is reduced.	10	29
64-72	56-63	Violent storm	Exceptionally high waves that may obscure small and medium-sized ships. The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility is reduced.	11	37
73 or more	64 or more	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very much reduced.	12	45

ATMOSPHERIC PRESSURE CONVERSION TABLE

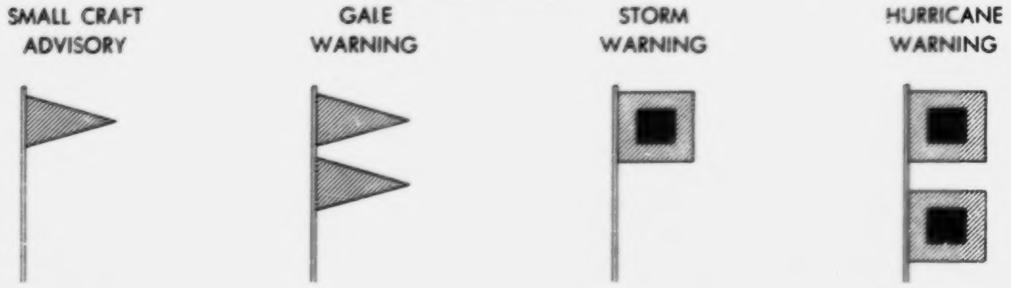
Inches	Millibars	Inches	Millibars	Inches	Millibars
28.44	963	29.32	993	30.21	1023
28.53	966	29.41	996	30.30	1026
28.62	969	29.50	999	30.39	1029
28.70	972	29.59	1002	30.48	1032
28.79	975	29.68	1005	30.56	1035
28.88	978	29.77	1008	30.65	1038
28.97	981	29.86	1011	30.74	1041
29.06	984	29.94	1014	30.83	1044
29.15	987	30.03	1017	30.92	1047
29.24	990	30.12	1020	31.01	1050

458

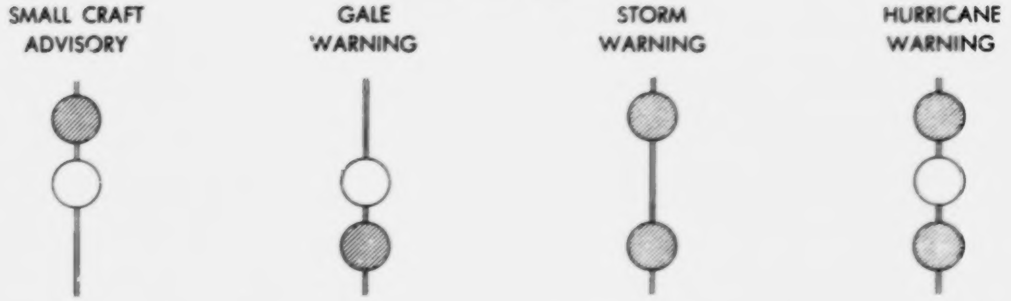
[redacted]

NATIONAL WEATHER SERVICE COASTAL WARNING DISPLAYS

DAYTIME SIGNALS



NIGHT (LIGHT) SIGNALS



Note: Shaded area represents the color RED on flags and lights.

EXPLANATION OF DISPLAYS

Small Craft Advisory: One RED pennant displayed by day and a RED light ABOVE a WHITE light at night, to alert mariners to sustained (more than two hours) weather or sea conditions, either present or forecast, that might be hazardous to small boats. Mariners learning of a Small Craft Advisory are urged to determine immediately the reason by tuning their radios to the latest marine broadcasts. Decision as to the degree of hazard will be left up to the boatman, based on his experience and size and type of boat. The threshold conditions for the Small Craft Advisory are usually 18 knots of wind (less than 18 knots in some dangerous waters) or hazardous wave conditions.

Gale Warning: Two RED pennants displayed by day and a WHITE light ABOVE a RED light at night to indicate that winds within the range 34 to 47 knots are forecast for the area.

Storm Warning: A single square RED flag with a BLACK center displayed during daytime and two RED lights at night to indicate that winds 48 knots and above, no matter how high the speed, are forecast for the area. However, if the winds are associated with a tropical cyclone (hurricane) the STORM WARNING display indicates that winds within the range 48 to 63 knots are forecast.

Hurricane Warning: Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day and a WHITE light between two RED lights at night to indicate that winds 64 knots and above are forecast for the area.

Note: A "HURRICANE WATCH" is an announcement issued by the National Weather Service via press and radio and television broadcasts whenever a tropical storm or hurricane becomes a threat to a coastal area. The "Hurricane Watch" announcement is not a warning, rather it indicates that the hurricane is near enough that everyone in the area covered by the "Watch" should listen to their radios for subsequent advisories and be ready to take precautionary action in case hurricane warnings are issued.

Note: A SPECIAL MARINE WARNING BULLETIN is issued whenever a severe local storm or strong wind of brief duration is imminent and is not covered by existing warnings or advisories. No visual displays will be used in connection with the Special Marine Warning Bulletin; boaters will be able to receive these special warnings by keeping tuned to a NOAA VHF-FM radio station or to Coast Guard and commercial radio stations that transmit marine weather information.

TRANS-PACIFIC DISTANCES

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: San Francisco, Calif., is 2091 nautical miles from Honolulu, Hawaii.

PANAMA CANAL (Pac. Ent.) 8°53.0'N., 79°31.0'W.	San Diego, Calif. 32°43.0'N., 117°10.5'W.	Long Beach, Calif. 33°46.2'N., 118°[illegible]3.3'W.	Los Angeles, Calif. 33°45.0'N., 118°16.2'W.	San Francisco, Calif. 37°48.5'N., 122°24.0'W.	Astoria, Oreg. 46°11.7 N., 123°50.0'W.	Portland, Oreg. 45°33.0'N., 122°41.7'W.	CAPE FLATTERY, WASH. 48°26.0'N., 124°47.0'W.	SWIFTSURE BANK, WASH. 48°31.0'N., 125°00.0'W.	Seattle, Wash. 47°36.2'N., 122°20.3'W.	Ketchikan, Alaska 55°20.5'N., 131°38.7'W.	Sitka, Alaska 57°03.1'N., 135°20.5'W.	CAPE SPENCER, ALASKA 58°10.0'N., 136°38.3'W.	Port Valdez, Alaska 61°06.0'N., 146°24.0'W.	Seward, Alaska 60°06.0'N., 149°26.0'W.	Anchorage, Alaska 61°14.2'N., 149°53.3'W.	Kodiak, Alaska 57°47.1'N., 152°25.1'W.	UNIMAK PASS, ALASKA 54°20.0'N., 164°45.0'W.	Kuluk Bay, Alaska 51°51.6'N., 176°37.6'W.	Hilo, Hawaii 19°44.1'N., 155°03.5'W.	Kawaihae, Hawaii 20°02.3'N., 155°49.9'W.	Kahului, Hawaii 20°54.0'N., 156°28.2'W.	Honolulu, Hawaii 21°18.5'N., 157°52.3'W.	Pearl Harbor, Hawaii 21°20.0'N., 157°58.3'W.	Nawiliwili, Hawaii 21°57.4'N., 159°21.5'W.	Port Allen, Hawaii 21°54.1'N., 159°35.6'W.	Midway Islands 28°13.0'N., 177°22.0'W.
2867																										
2939	94																									
2939	95	3																								
3270	455	374	371																							
3803	989	908	904	567																						
3888	1074	992	989	652	85																					
3920	1104	1024	1020	683	153	238																				
--	--	--	--	--	--	--	10																			
4044	1228	1148	1144	807	278	362	124	134																		
4387	1575	1497	1493	1156	660	745	--	518	659*																	
4538	1723	1643	1639	1302	815	900	--	681	815	224																
4603	1787	1707	1703	1366	883	968	--	739	976*	307	85															
4984	2174	2092	2089	1745	1239	1324	--	1100	1234	713	479	400														
4940	2124	2043	2040	1702	1242	1327	--	1100	1234	682	494	422	144													
5117	2303	2223	2220	1882	1435	1520	--	1294	1428	892	708	641	385	274												
4924	2115	2034	2031	1693	1261	1346	--	1124	1258	742	564	505	280	175	242											
5228	2412	2331	2328	1990	1626	1711	--	1510	1644	1193	1027	987	761	652	688	505										
5604	2806	2725	2722	2403	2071	2156	--	1973	2107	1656	1490	1450	1224	1115	1151	968	463									
4527	2175	2143	2140	2019	2214	2299	2260	--	2384	2398	2410	2447	2524	2439	2542	2296	2126	2198								
4594	2219	2183	2180	2051	2235	2320	2276	--	2400	2405	2412	2445	2513	2432	2535	2289	2110	2164	83							
4609	2212	2173	2170	2036	2207	2292	2245	--	2369	2361	2365	2398	2463	2377	2479	2233	2044	2099	121	85						
4685	2278	2236	2233	2091	2246	2331	2285	--	2409	2383	2385	2411	2468	2373	2477	2230	2028	2061	196	140	89					
4690	2283	2241	2238	2096	2251	2336	2290	--	2414	2388	2390	2416	2473	2378	2482	2235	2024	2057	201	145	94	9				
4767	2330	2284	2281	2128	2262	2347	2289	--	2413	2368	2361	2388	2429	2332	2440	2184	1963	1989	287	230	181	96	92			
4777	2347	2302	2299	2146	2281	2366	2308	--	2432	2387	2380	2407	2445	2351	2459	2203	1972	1990	297	240	153	106	102	21		
5707	3097	3034	3031	2792	2724	2809	2694	--	2818	2570	2481	2472	2386	2250	2305	2088	1680	1460	1338	1278	1232	1150	1146	1069	1042	

* Via inside passage

460

BEST DOCUMENT AVAILABLE

COASTWISE DISTANCES

SAN DIEGO, CALIF., TO CAPE FLATTERY, WASH.

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example. San Francisco, Calif., is 652 nautical miles from Portland, Oreg.

San Diego, Calif. 32°43.0'N., 117°10.5'W.	Newport Beach, Calif. 33°37.1'N., 117°55.5'W.	Long Beach, Calif. 33°46.2'N., 118°13.3'W.	Los Angeles, Calif. 33°45.0'N., 118°16.2'W.	Port Hueneme, Calif. 34°09.0'N., 119°12.4'W.	Santa Barbara, Calif. 34°24.5'N., 119°41.1'W.	Port San Luis, Calif. 35°10.4'N., 120°44.8'W.	Monterey, Calif. 36°36.5'N., 121°53.0'W.	San Francisco, Calif. 37°48.5'N., 122°24.0'W.	Oakland, Calif. 37°48.2'N., 122°19.5'W.	Stockton, Calif. 37°57.2'N., 121°18.8'W.	Sacramento, Calif. 38°33.8'N., 121°33.0'W.	Eureka, Calif. 40°47.8'N., 124°11.2'W.	Crescent City, Calif. 41°44.5'N., 124°11.4'W.	Coos Bay, Oreg. 43°22.4'N., 124°12.5'W.	Gardiner, Oreg. 43°43.9'N., 124°06.8'W.	Florence, Oreg. 43°58.0'N., 124°06.3'W.	Newport, Oreg. 44°37.8'N., 124°03.1'W.	Depoe Bay, Oreg. 44°48.6'N., 124°03.6'W.	Garibaldi, Oreg. 45°33.3'N., 123°55.1'W.	Astoria, Oreg. 46°11.7'N., 123°50.0'W.	Longview, Wash. 46°06.3'N., 122°57.7'W.	Vancouver, Wash. 45°37.6'N., 122°41.3'W.	Portland, Oreg. 45°33.0'N., 122°41.7'W.	South Bend, Wash. 46°40.1'N., 123°47.5'W.	Aberdeen, Wash. 46°58.4'N., 123°48.5'W.	CAPE FLATTERY, WASH. 48°26.0'N., 124°47.0'W.
78																										
94	25																									
95	27	3																								
147	81	66	62																							
174	108	94	90	29																						
259	193	179	175	116	91																					
370	304	290	286	228	203	121																				
455	389	374	371	312	287	205	96																			
458	392	377	374	315	290	208	100	3																		
526	460	445	442	383	358	276	167	75	78																	
530	464	449	446	387	362	280	171	79	82	75																
653	587	572	569	510	485	403	294	232	235	303	307															
704	638	624	620	561	537	455	346	283	287	354	358	64														
817	751	736	733	674	649	567	459	396	399	467	471	180	125													
832	766	751	748	689	664	582	474	411	414	482	486	195	140	42												
848	782	768	764	706	681	599	490	427	430	498	502	212	156	59	36											
881	815	800	797	737	713	631	522	459	463	531	534	244	188	92	69	43										
891	825	810	807	748	723	641	532	469	473	541	544	254	199	101	78	54	16									
937	871	857	853	794	770	687	579	516	520	588	591	301	245	150	127	102	63	50								
989	922	908	904	845	821	739	630	567	570	639	642	352	296	201	178	153	115	101	58							
1034	967	953	949	890	866	783	675	612	615	684	687	397	341	246	223	198	160	146	103	45						
1070	1003	988	985	925	901	819	710	647	651	719	722	432	377	281	258	234	196	182	138	80	34					
1074	1007	992	989	930	905	823	714	652	655	723	727	436	381	285	262	238	200	186	142	85	39	13				
1019	953	939	935	876	852	769	661	598	601	670	673	383	327	232	209	184	146	133	90	63	108	143	147			
1031	965	951	947	888	864	781	673	610	613	682	685	395	339	244	221	196	158	144	102	75	119	155	159	53		
1104	1038	1024	1020	961	937	854	746	683	686	755	758	468	411	321	298	273	235	222	179	153	198	234	238	131	117	

Entrance buoy (32°37.3'N., 117°14.7'W.) to San Diego, 8.3 miles.
Entrance buoy (33°42.7'N., 118°11.0'W.) to Long Beach, 4.3 miles.
Entrance buoy (33°42.0'N., 118°14.5'W.) to Los Angeles, 3.8 miles.
Entrance buoy (37°45.0'N., 122°41.5'W.) to San Francisco, 15.0 miles; Oakland, 18.5 miles; Stockton, 87 miles; Sacramento, 91 miles.
Humboldt Bay entrance buoy (40°46.4'N., 124°16.2'W.) to Eureka, 5.5 miles.
Entrance buoy (43°22.2'N., 124°23.0'W.) to Coos Bay (city), 13.3 miles.
Yaquina Bay entrance buoy (44°35.9'N., 124°06.7'W.) to Newport, 3.3 miles.
Columbia River LNB (46°11.1'N., 124°11.0'W.) to: Astoria, 17.8 miles; Longview, 64 Miles; Vancouver, 98 miles; Portland, 103 miles.
Willapa Bay entrance buoy (46°44.3'N., 124°10.4'W.) to South Bend, 19 miles.
Grays Harbor entrance buoy (46°51.4'N., 124°14.1'W.) to Aberdeen, 21 miles.

SAN FRANCISCO BAY AREA DISTANCES

CALIFORNIA

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Sacramento, Calif., is 74 nautical miles from Napa, Calif.

	San Francisco Bay								San Pablo Bay			Suisun Bay			San Joaquin R.		Sacramento River		
	San Francisco 37°48.5'N., 122°24.0'W.	Hunters Point 37°43.1'N., 122°21.5'W.	Redwood City 37°30.8'N., 122°12.5'W.	Oakland 37°48.2'N., 122°19.5'W.	Richmond 37°54.6'N., 122°21.7'W.	Sausalito 37°51.6'N., 122°28.6'W.	San Rafael 37°58.1'N., 122°30.7'W.	Petaluma 38°14.1'N., 122°38.2'W.	Vallejo 38°05.3'N., 122°15.3'W.	Napa 38°17.7'N., 122°16.9'W.	Benicia 38°02.4'N., 122°08.2'W.	Pittsburg 38°02.1'N., 121°52.6'W.	Antioch 38°01.1'N., 121°48.7'W.	Stockton 37°57.2'N., 121°18.8'W.	Hills Ferry 37°20.4'N., 120°58.5'W.	Rio Vista 38°09.3'N., 121°41.3'W.	Sacramento 38°33.8'N., 121°33.0'W.	Knights Landing 38°48.1'N., 121°43.1'W.	Colusa 39°13.0'N., 122°00.0'W.
Hunters Point	6																		
Redwood City	22	16																	
Oakland	3	7	22																
Richmond	11	17	32	14															
Sausalito	5	11	27	8	7														
San Rafael	13	19	35	16	9	11													
Petaluma	33	39	54	36	29	31	27												
Vallejo	23	29	44	26	19	21	17	28											
Napa	37	43	58	40	34	36	32	43	15										
Benicia	27	33	49	30	24	25	21	33	8	22									
Pittsburg	40	46	62	43	37	39	35	46	21	36	14								
Antioch	44	50	65	47	40	42	38	50	24	39	17	3							
Stockton	75	81	96	78	71	73	69	81	55	70	48	35	31						
Hills Ferry	147	153	168	149	143	145	141	153	127	142	120	107	103	74					
Rio Vista	52	58	73	55	49	51	47	58	33	48	26	14	17	48	100				
Sacramento	78	84	100	81	75	77	73	85	59	74	52	40	44	75	127	27			
Knights Landing	107	113	129	110	104	106	102	114	88	103	81	69	73	84	156	56	29		
Colusa	155	161	177	158	152	154	150	162	136	151	129	117	121	132	204	104	77	47	
Chico Landing 39°42.6'N., 121°56.6'W.	197	203	219	200	194	196	192	204	178	193	171	159	163	174	246	146	119	89	42

BEST DOCUMENT AVAILABLE

DISTANCES ON COLUMBIA RIVER SYSTEM

Figure at intersection of columns opposite ports in question is the nautical/statute mileage between the two. Example: Astoria, Oreg., is 85 nautical miles (98 statute miles) from Portland, Oreg.

Nautical Miles

Statute Miles

	Columbia River Mouth	Ilwaco	Warrenton	Astoria	Longview	St. Helens	Vancouver	Bonneville Lock & Dam	Hood River (town)	The Dalles Lock & Dam	John Day Lock & Dam	Arlington	Umatilla	McNary Lock & Dam	Port of Walla Walla	Pasco	Richland	Portland	Oregon City	Salem	Albany	Corvallis	Harrisburg	Ice Harbor Dam	Central Ferry	Lewiston	Johnson Bar Landing
Columbia River Mouth 46°14.8'N., 124°05.5'W.		7	13	14	67	86	106	145	170	191	216	242	289	292	318	328	337	112	127	186	221	234	265	335	407	465	556
Ilwaco, Wash. 46°18.3'N., 124°02.2'W.	6		14	15	68	87	107	146	171	192	217	243	290	292	318	329	338	113	128	188	222	234	265	336	409	465	557
Warrenton, Oreg. 46°10.1'N., 123°55.0'W.	11	12		5	58	77	97	136	161	183	207	232	281	283	308	319	328	102	119	177	212	224	255	326	398	456	547
Astoria, Oreg. 46°11.7'N., 123°50.0'W.	12	13	4		52	71	92	131	157	177	203	228	275	277	303	314	323	98	113	171	207	219	250	320	394	450	541
Longview, Wash. 46°06.3'N., 122°57.7'W.	58	59	50	45		20	39	78	104	124	150	175	222	224	250	261	270	45	60	120	154	166	197	268	341	397	489
St. Helens, Oreg. 45°51.7'N., 122°47.8'W.	75	76	67	62	17		23	63	87	109	135	159	207	209	235	246	255	29	45	104	139	151	182	252	325	382	473
Vancouver, Wash. 45°37.6'N., 122°41.3'W.	92	93	84	80	34	20		40	64	86	110	136	184	186	212	222	232	15	30	89	124	136	167	229	302	359	450
Bonneville Lock & Dam 45°38.3'N., 121°56.8'W.	126	127	118	114	68	55	35		25	46	71	97	144	146	171	183	192	54	70	129	163	176	207	189	262	319	410
Hood River (town), Oreg. 45°43.0'N., 121°30.0'W.	148	149	140	136	90	76	56	22		21	46	71	119	122	147	158	167	79	94	154	189	200	231	165	237	295	386
The Dalles Lock & Dam 45°36.9'N., 121°08.3'W.	166	167	159	154	108	95	75	40	18		25	51	98	100	125	137	146	100	116	175	211	222	253	143	216	273	364
John Day Lock & Dam 45°42.9'N., 120°41.5'W.	188	189	180	176	130	117	96	62	40	22		25	72	75	100	112	121	125	142	200	235	247	278	117	191	247	338
Arlington, Oreg. 45°43.6'N., 120°12.2'W.	210	211	202	198	152	138	118	84	62	44	22		48	51	76	86	96	150	166	224	260	272	303	93	166	223	314
Umatilla, Oreg. 45°55.4'N., 119°20.5'W.	251	252	244	239	193	180	160	125	103	85	63	42		2	28	39	48	198	214	273	308	320	351	45	119	175	266
McNary Lock & Dam 45°56.4'N., 119°17.9'W.	254	254	246	241	195	182	162	127	106	87	65	44	2		25	37	46	200	216	275	311	322	353	43	116	173	264
Port of Walla Walla, Wash. 46°06.0'N., 118°55.3'W.	276	276	268	263	217	204	184	149	128	109	87	66	24	22		12	21	226	242	300	336	348	379	17	91	147	238
Pasco, Wash. 46°13.2'N., 119°05.8'W.	285	286	277	273	227	214	193	159	137	119	97	75	34	32	10		9	237	253	312	346	359	390	14	86	144	235
Richland, Wash. 46°16.5'N., 119°16.1'W.	293	294	285	281	235	222	202	167	145	127	105	83	42	40	18	8		246	262	321	356	368	399	23	96	153	244
Portland, Oreg. 45°33.0'N., 122°41.7'W.	97	98	89	85	39	25	13	47	69	87	109	130	172	174	196	206	214		16	75	110	122	153	243	316	373	464
Oregon City, Oreg. 45°21.5'N., 122°36.5'W.	110	111	103	98	52	39	26	61	82	101	123	144	186	188	210	220	228	14		59	94	106	137	259	331	389	480
Salem, Oreg. 44°56.2'N., 123°03.1'W.	162	163	154	149	104	90	77	112	134	152	174	195	237	239	261	271	279	65	51		36	47	78	318	391	448	539
Albany, Oreg. 44°38.3'N., 123°06.2'W.	192	193	184	180	134	121	108	142	164	183	204	226	268	270	292	301	309	96	82	31		12	43	353	426	483	574
Corvallis, Oreg. 44°34.0'N., 123°15.3'W.	203	203	195	190	144	131	118	153	174	193	215	236	278	280	302	312	320	106	92	41	10		31	365	437	495	586
Harrisburg, Oreg. 44°16.0'N., 123°10.2'W.	230	230	222	217	171	158	145	180	201	220	242	263	305	307	329	339	347	133	119	68	37	27		396	468	526	617
Ice Harbor Dam, Wash. 46°15.1'N., 118°52.7'W.	291	292	283	278	233	219	199	164	143	124	102	81	39	37	15	12	20	211	225	276	307	317	344		72	130	221
Central Ferry, Wash. 46°37.6'N., 117°46.6'W.	354	355	346	342	296	282	262	228	206	188	166	144	103	101	79	75	83	275	288	340	370	380	407	63		58	148
Lewiston, Idaho 46°25.1'N., 116°59.9'W.	404	404	396	391	345	332	312	277	256	237	215	194	152	150	128	125	133	324	338	389	420	430	457	113	50		91
Johnson Bar Landing, Idaho 45°27.6'N., 116°33.8'W.	483	484	475	470	425	411	391	356	335	316	294	273	231	229	207	204	212	403	417	468	499	509	536	192	129	79	

Columbia River

Willamette River

Snake River

DISTANCES IN STRAIT OF JUAN DE FUCA AND STRAIT OF GEORGIA

CAPE FLATTERY, WASH., TO SEATTLE, WASH., AND VANCOUVER, CANADA

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Port Angeles, Wash., is 69 nautical miles from Seattle, Wash.

	CAPE FLATTERY, WASH.	SWIFTSURE BANK, WASH.	Neah Bay, Wash.	Port Angeles, Wash.	Victoria, Canada	Port Townsend, Wash.	Port Ludlow, Wash.	Port Gamble, Wash.	Everett, Wash.	Point Wells, Wash.	Seattle, Wash.	Eagle Harbor, Wash.	Bremerton, Wash.	Tacoma, Wash.	Olympia, Wash.	Roche Harbor, Wash.	Friday Harbor, Wash.	Anacortes, Wash.	Bellingham, Wash.	Blaine, Wash.	Nanaimo, Canada	New Westminster, Canada
CAPE FLATTERY, WASH. 48°26.0'N., 124°47.0'W.																						
SWIFTSURE BANK, WASH. 48°31.0'N., 125°00.0'W.	10																					
Neah Bay, Wash. 48°22.4'N., 124°36.5'W.	10	20																				
Port Angeles, Wash. 48°07.5'N., 123°26.4'W.	61	71	54																			
Victoria, Canada 48°25.0'N., 123°23.5'W.	62	71	55	19																		
Port Townsend, Wash. 48°06.8'N., 122°45.2'W.	86	96	79	32	34																	
Port Ludlow, Wash. 47°55.3'N., 122°41.0'W.	100	110	93	46	48	16																
Port Gamble, Wash. 47°51.3'N., 122°34.7'W.	104	114	97	50	53	21	10															
Everett, Wash. 47°59.3'N., 122°13.2'W.	117	127	110	63	66	34	26	28														
Point Wells, Wash. 47°47.1'N., 122°23.7'W.	111	121	103	56	59	27	19	21	16													
Seattle, Wash. 47°36.2'N., 122°20.3'W.	124	134	116	69	72	40	32	34	30	14												
Eagle Harbor, Wash. 47°37.2'N., 122°30.7'W.	123	133	115	68	71	40	32	34	29	14	8											
Bremerton, Wash. 47°33.5'N., 122°38.0'W.	131	141	124	77	80	48	40	42	38	23	14	13										
Tacoma, Wash. 47°16.0'N., 122°26.0'W.	143	153	136	89	91	59	52	53	49	34	25	25	29									
Olympia, Wash. 47°03.1'N., 122°54.3'W.	168	178	160	113	115	84	75	78	73	59	50	50	50	34								
Roche Harbor, Wash. 48°36.6'N., 123°09.1'W.	83	92	76	36	25	41	54	58	71	64	77	76	85	96	121							
Friday Harbor, Wash. 48°32.2'N., 123°00.9'W.	87	96	80	37	30	30	44	48	62	54	67	67	76	86	112	12						
Anacortes, Wash. 48°31.4'N., 122°36.7'W.	93	102	86	42	36	30	43	47	49	54	66	66	74	86	110	27	18					
Bellingham, Wash. 48°45.1'N., 122°29.0'W.	108	117	101	54	50	43	57	61	63	68	80	80	88	100	124	37	28	17				
Blaine, Wash. 48°59.5'N., 122°45.9'W.	112	121	105	65	55	59	72	76	80	83	95	95	104	115	139	35	37	36	38			
Nanaimo, Canada 49°10.1'N., 123°56.0'W.	145	154	138	99	89	97	111	115	118	121	134	134	142	154	177	66	69	76	75	55		
New Westminster, Canada 49°12.0'N., 122°54.5'W.	139	148	132	93	82	91	105	109	114	116	128	128	137	148	171	60	60	70	71	48	48	
Vancouver, Canada 49°17.4'N., 123°06.6'W.	141	150	133	95	83	92	106	110	115	117	129	129	138	149	173	62	62	71	72	48	36	41

464

HAWAII DISTANCES

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Hilo is 196 nautical miles from Honolulu.

Hilo, Hawaii 19°44.1'N., 155°03.5'W.	Napoopoo, Hawaii 19°28.6'N., 155°55.3'W.	Kailua, Hawaii 19°38.6'N., 156°00.0'W.	Kawaihae, Hawaii 20°02.3'N., 155°49.9'W.	Mahukona, Hawaii 20°11.2'N., 155°54.2'W.	Hana, Maui 20°45.6'N., 155°59.1'W.	Lahaina (Mala), Maui 20°53.5'N., 156°41.5'W.	Kahului, Maui 20°54.0'N., 156°28.2'W.	Kaumalapau, Lanai 20°47.4'N., 156°59.7'W.	Kamalo, Molokai 21°02.9'N., 156°52.7'W.	Kaunakakai, Molokai 21°05.1'N., 157°02.0'W.	Haleolono, Molokai 21°05.2'N., 157°15.2'W.	Kalaupapa, Molokai 21°11.7'N., 156°59.3'W.	Honolulu, Oahu 21°18.5'N., 157°52.3'W.	Pearl Harbor, Oahu 21°20.0'N., 157°58.3'W.	Ahukini, Kauai 21°59.7'N., 159°20.1'W.	Nawiliwili, Kauai 21°57.4'N., 159°21.5'W.	Port Allen, Kauai 21°54.1'N., 159°35.6'W.	Waimea, Kauai 21°57.4'N., 159°40.4'W.	Hanalei, Kauai 22°12.9'N., 159°30.1'W.	Nonopapa, Niihau 21°52.0'N., 160°14.1'W.	Midway Islands 28°13.0'N., 177°22.0'W.	Johnston Island 16°44.6'N., 169°31.2'W.	Palmyra Island 5°52.5'N., 162°08.0'W.
120																							
109	11																						
83	45	34																					
72	50	39	12																				
85	84	73	48	36																			
125	99	88	72	63	57																		
121	120	110	85	74	37	27																	
136	101	91	82	76	72	25	50																
137	112	102	86	77	59	15	30	25															
145	120	109	93	85	69	23	39	21	12														
155	124	114	103	95	80	34	50	24	22	13													
154	138	127	110	102	70	39	41	54	37	45	33												
196	157	147	140	133	119	73	89	60	61	52	40	53											
201	162	152	145	138	124	78	94	65	66	57	45	58	9										
287	245	236	230	223	210	165	181	151	153	144	132	143	96	92									
287	244	235	230	223	210	165	181	151	153	144	132	144	96	92	5								
297	254	245	240	233	220	177	193	161	163	154	142	156	106	102	23	21							
303	260	251	246	239	226	182	199	167	169	160	148	162	112	108	29	27	8						
308	266	257	251	244	224	186	194	172	173	164	152	159	116	112	29	32	42	35					
332	287	278	277	272	262	214	232	199	203	193	181	194	147	143	65	63	45	40	52				
1338	--	--	1278	--	--	--	1232	--	--	--	--	--	1150	1146	--	1069	1042	--	--	--			
905	--	--	811	--	--	--	798	--	--	--	--	--	725	722	--	668	656	--	--	--	825		
959	--	--	928	--	--	--	1010	--	--	--	--	--	959	960	--	986	979	--	--	--	1606	785	

Radio Bearing Conversion Table

Table of corrections, in minutes

[DIFFERENCE OF LONGITUDE IN DEGREES]

Mid. L.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
15°	4	8	12	16	19	23	27	31	35	40	43	47	50	54	58	62	66	70	74	78
16°	4	8	12	17	21	25	29	33	37	41	45	50	54	58	62	66	70	74	79	83
17°	4	9	13	18	22	26	31	35	39	44	48	53	57	61	66	70	75	79	83	88
18°	5	9	13	19	23	28	32	37	42	46	51	56	60	65	70	74	79	83	88	93
19°	5	10	15	20	24	29	34	39	44	49	54	59	63	68	73	78	83	88	93	98
20°	5	10	15	21	26	31	36	41	46	51	56	62	67	72	77	82	87	92	98	103
21°	5	11	16	21	27	32	38	43	48	54	59	64	70	75	81	86	91	97	102	108
22°	6	11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	95	101	107	112
23°	6	12	18	23	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
24°	6	12	18	24	31	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
25°	6	13	19	25	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
26°	7	13	20	26	33	39	46	53	59	66	72	79	85	92	99	105	112	118	125	131
27°	7	14	20	27	34	41	48	54	61	68	75	82	89	95	102	109	116	123	129	136
28°	7	14	21	28	35	42	49	56	63	70	77	84	92	99	106	113	120	127	134	141
29°	7	15	21	29	36	44	51	58	65	73	80	87	95	102	109	116	124	131	138	145
30°	7	15	22	30	38	45	53	60	68	75	83	90	98	105	113	120	127	135	143	150
31°	8	15	23	31	39	46	54	62	70	77	85	93	100	108	116	124	131	139	146	155
32°	8	16	24	32	40	48	56	64	72	79	87	95	103	111	119	127	135	143	151	159
33°	8	16	25	33	41	49	57	65	74	82	90	98	106	114	123	131	139	147	155	163
34°	8	17	25	34	42	50	59	67	75	84	92	101	109	117	126	134	143	151	159	168
35°	9	17	26	34	43	52	60	69	77	86	95	103	112	120	129	138	146	155	163	172
36°	9	18	26	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	168	176
37°	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	163	172	181
38°	9	18	28	37	46	55	65	74	83	92	102	111	120	129	139	148	157	166	175	185
39°	9	19	28	38	47	57	66	75	85	94	104	113	123	132	142	151	160	170	179	189
40°	10	19	29	39	48	58	68	77	87	96	106	116	125	135	145	154	164	174	183	193
41°	10	20	30	39	49	59	69	79	89	98	108	118	128	138	148	157	167	177	187	197
42°	10	20	30	40	50	60	70	80	90	100	110	120	130	140	151	161	171	181	191	201
43°	10	20	31	41	51	61	72	82	92	102	113	123	133	143	153	164	174	184	194	205
44°	10	21	31	42	52	63	73	83	94	104	115	125	135	146	156	167	177	188	198	208
45°	11	21	32	42	53	64	74	85	95	106	117	127	138	149	159	170	180	191	201	212
46°	11	22	32	43	54	65	76	86	97	108	119	129	140	151	162	173	183	194	205	216
47°	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	186	197	208	219
48°	11	22	33	45	56	67	78	89	100	111	123	134	145	156	167	178	190	201	212	223
49°	11	23	34	45	57	68	79	91	102	113	125	136	147	158	170	161	192	204	215	226
50°	11	23	34	45	57	69	80	92	103	115	126	138	149	161	172	184	195	207	218	230
51°	12	23	35	47	58	70	82	93	105	117	128	140	152	163	175	186	198	210	221	233
52°	12	24	35	47	59	71	83	95	106	118	130	142	154	165	177	189	201	213	225	236
53°	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
54°	12	24	36	49	61	73	85	97	109	121	133	146	158	170	182	194	206	218	231	243
55°	12	25	37	49	61	74	86	98	111	123	135	147	160	172	184	197	209	221	233	246
56°	12	25	37	50	62	75	87	100	112	124	137	149	162	174	187	199	211	224	236	249
57°	13	25	38	50	63	75	88	101	113	126	138	151	164	176	189	201	214	226	239	252
58°	13	25	38	51	64	76	89	102	115	127	140	153	165	178	191	204	216	229	242	254
59°	13	26	39	51	64	77	90	103	116	129	141	154	167	180	193	206	219	231	244	257
60°	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260

Example. A ship in latitude 39°51′. N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon located in latitude 40°37′. N., longitude 69°37′ W.

Radiobeacon station .... Latitude 40°37′ N.
Dead-reckoning position of ship .... Latitude 39°51′

Middle latitude .... 40°14′
Radiobeacon station .... Longitude 69°37′ W.
Dead reckoning position of ship .... Longitude 67°35′

Longitude difference .... 2°02′

Entering the table with difference of longitude equals 2°, which is the nearest tabulated value and opposite 40° middle latitude, the correction of 39′ is read.

As the ship is east of the radiobeacon, a minus correction is applied. The Mercator bearing then will be 299° − 000°39′ = 298°21′. To facilitate plotting, subtract 180° and plot from the position of the radiobeacon the bearing 298°21′ − 180°, or 118°21′ (Mercator bearing reckoned clockwise from true north).

Distance of Visibility of Objects at Sea

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles
6	2. 8	48	7. 9	220	17. 0	660	29. 4	2, 000	51. 2
8	3. 1	50	8. 1	240	17. 7	680	29. 9	2, 200	53. 8
10	3. 6	55	8. 5	260	18. 5	700	30. 3	2, 400	56. 2
12	4. 0	60	8. 9	280	19. 2	720	30. 7	2, 600	58. 5
14	4. 3	65	9. 2	300	19. 9	740	31. 1	2, 800	60. 6
15	4. 4	70	9. 6	320	20. 5	760	31. 6	3, 000	62. 8
16	4. 6	75	9. 9	340	21. 1	780	32. 0	3, 200	64. 9
18	4. 9	80	10. 3	360	21. 7	800	32. 4	3, 400	66. 9
20	5. 1	85	10. 6	380	22. 3	820	32. 8	3, 600	68. 6
22	5. 4	90	10. 9	400	22. 9	840	33. 2	3, 800	70. 7
24	5. 6	95	11. 2	420	23. 5	860	33. 6	4, 000	72. 5
26	5. 8	100	11. 5	440	24. 1	880	34. 0	4, 200	74. 3
28	6. 1	110	12. 0	460	24. 6	900	34. 4	4, 400	76. 1
30	6. 3	120	12. 6	480	25. 1	920	34. 7	4, 600	77. 7
32	6. 5	130	13. 1	500	25. 6	940	35. 2	4, 800	79. 4
34	6. 7	140	13. 6	520	26. 1	960	35. 5	5, 000	81. 0
36	6. 9	150	14. 1	540	26. 7	980	35. 9	6, 000	88. 8
38	7. 0	160	14. 5	560	27. 1	1, 000	36. 2	7, 000	96. 0
40	7. 2	170	14. 9	580	27. 6	1, 200	39. 6	8, 000	102. 6
42	7. 4	180	15. 4	600	28. 0	1, 400	42. 9	9, 000	108. 7
44	7. 6	190	15. 8	620	28. 6	1, 600	45. 8	10, 000	114. 6
46	7. 8	200	16. 2	640	29. 0	1, 800	48. 6		

Conversion Table, Degrees to Points and Vice Versa

° ′	Points	° ′	Points	° ′	Points	° ′	Points
0 00	N	90 00	E	180 00	S	270 00	W
2 49		92 49		182 49		272 49	
5 38	N ½ E	95 38	E ½ S	185 38	S ½ W	275 38	W ½ N
8 26		98 26		188 26		278 26	
11 15	N x E	101 15	E x S	191 15	S x W	281 15	W x N
14 04		104 04		194 04		284 04	
16 53	N x E ½ E	106 53	ESE ½ E	196 53	S x W ½ W	286 53	WNW ½ W
19 41		109 41		199 41		289 41	
22 30	NNE	112 30	ESE	202 30	SSW	292 30	WNW
25 19		115 19		205 19		295 19	
28 08	NNE ½ E	118 08	SE x E ½ E	208 08	SSW ½ W	298 08	NW x W ½ W
30 56		120 56		219 56		300 56	
33 45	NE x N	123 45	SE x E	213 45	SW x S	303 45	NW x W
36 34		126 34		216 34		306 34	
39 23	NE ½ N	129 23	SE ½ E	219 23	SW ½ S	309 23	NW ½ W
42 11		132 11		222 11		312 11	
45 00	NE	135 00	SE	225 00	SW	315 00	NW
47 49		137 49		227 49		317 49	
50 38	NE ½ E	140 38	SE ½ S	230 38	SW ½ W	320 38	NW ½ N
53 26		143 26		233 26		323 26	
56 15	NE x E	146 15	SE x S	236 15	SW x W	326 15	NW x N
59 04		149 04		239 04		329 04	
61 53	NE x E ½ E	151 53	SSE ½ E	241 53	SW x W ½ W	331 53	NNW ½ W
64 41		154 41		244 41		334 41	
67 30	ENE	157 30	SSE	247 30	WSW	337 30	NNW
70 19		160 19		250 19		340 19	
73 08	ENE ½ E	163 08	S x E ½ E	253 08	WSW ½ W	343 08	N x W ½ W
75 56		165 56		255 56		345 56	
78 45	E x N	168 45	S x E	258 45	W x S	348 45	N x W
81 34		171 34		261 34		351 34	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ S	354 23	N ½ W
87 11		177 11		267 11		357 11	

Conversion Tables

INTERNATIONAL NAUTICAL MILES TO STATUTE MILES

1 nautical mile   6,076.10 feet or 1,852 meters   1 statute mile = 5,280 feet or 1,609.35 meters

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0.000	1.151	2.302	3.452	4.603	5.754	6.905	8.055	9.206	10.357
10	11.508	12.659	13.809	14.960	16.111	17.262	18.412	19.563	20.714	21.865
20	23.016	24.166	25.317	26.468	27.619	28.769	29.920	31.071	32.222	33.373
30	34.523	35.674	36.825	37.976	39.126	40.277	41.428	42.579	43.730	44.880
40	46.031	47.182	48.333	49.483	50.634	51.785	52.936	54.087	55.237	56.388
50	57.539	58.690	59.840	60.991	62.142	63.293	64.444	65.594	66.745	67.896
60	69.047	70.197	71.348	72.499	73.650	74.801	75.951	77.102	78.253	79.404
70	80.554	81.705	82.856	84.007	85.158	86.308	87.459	88.610	89.761	90.911
80	92.062	93.213	94.364	95.515	96.665	97.816	98.967	100.118	101.268	102.419
90	103.570	104.721	105.871	107.022	108.173	109.324	110.475	111.625	112.776	113.927

STATUTE MILES TO INTERNATIONAL NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0.000	0.869	1.738	2.607	3.476	4.345	5.214	6.083	6.952	7.821
10	8.690	9.559	10.428	11.297	12.166	13.035	13.904	14.773	15.642	16.511
20	17.380	18.249	19.118	19.986	20.855	21.724	22.593	23.462	24.331	25.200
30	26.069	26.938	27.807	28.676	29.545	30.414	31.283	32.152	33.021	33.890
40	34.759	35.628	36.497	37.366	38.235	39.104	39.973	40.842	41.711	42.580
50	43.449	44.318	45.187	46.056	46.925	47.794	48.663	49.532	50.401	51.270
60	52.139	53.008	53.877	54.746	55.615	56.484	57.353	58.222	59.091	59.959
70	60.828	61.697	62.566	63.435	64.304	65.173	66.042	66.911	67.780	68.649
80	69.518	70.387	71.256	72.125	72.994	73.863	74.732	75.601	76.470	77.339
90	78.208	79.077	79.946	80.815	81.684	82.553	83.422	84.291	85.160	86.029

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

METERS TO FEET

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

BEST DOCUMENT AVAILABLE

TABLE FOR ESTIMATING TIME OF TRANSIT

Distance	Speed in knots																		
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	30
Nautical miles	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*
10	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1						
20	0-3	0-2	0-2	0-2	0-2	0-2	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
30	0-4	0-3	0-3	0-3	0-3	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-1	0-1	0-1	0-1	0-1	0-1
40	0-5	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-1
50	0-6	0-6	0-5	0-5	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-3	0-2	0-2	0-2	0-2	0-2	0-2
60	0-8	0-7	0-6	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-2	0-2
70	0-9	0-8	0-7	0-6	0-6	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-2
80	0-10	0-9	0-8	0-7	0-7	0-6	0-6	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-4	0-3	0-3	0-3	0-3
90	0-11	0-10	0-9	0-8	0-8	0-7	0-6	0-6	0-6	0-5	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-4	0-3
100	0-13	0-11	0-10	0-9	0-8	0-8	0-7	0-7	0-6	0-6	0-6	0-5	0-5	0-5	0-5	0-4	0-4	0-4	0-3
200	1-1	0-22	0-20	0-18	0-17	0-15	0-14	0-13	0-13	0-12	0-11	0-11	0-10	0-10	0-9	0-9	0-8	0-8	0-7
300	1-14	1-9	1-6	1-3	1-1	0-23	0-21	0-20	0-19	0-18	0-17	0-16	0-15	0-14	0-14	0-13	0-13	0-12	0-10
400	2-2	1-20	1-16	1-12	1-9	1-7	1-5	1-3	1-1	1-0	0-22	0-21	0-20	0-19	0-18	0-17	0-17	0-16	0-13
500	2-15	2-8	2-2	1-21	1-18	1-14	1-12	1-9	1-7	1-5	1-4	1-2	1-1	1-0	0-23	0-22	0-21	0-20	0-17
600	3-3	2-19	2-12	2-7	2-2	1-22	1-19	1-16	1-14	1-11	1-9	1-8	1-6	1-5	1-3	1-2	1-1	1-0	0-20
700	3-16	3-6	2-22	2-16	2-10	2-6	2-2	1-23	1-20	1-17	1-15	1-13	1-11	1-9	1-8	1-6	1-5	1-4	0-23
800	4-4	3-17	3-8	3-1	2-19	2-14	2-9	2-5	2-2	1-23	1-20	1-18	1-16	1-14	1-12	1-11	1-9	1-8	1-3
900	4-17	4-4	3-18	3-10	3-3	2-21	2-16	2-12	2-8	2-5	2-2	1-23	1-21	1-19	1-17	1-15	1-14	1-12	1-6
1,000	5-5	4-15	4-4	3-19	3-11	3-5	2-23	2-19	2-15	2-11	2-8	2-5	2-2	2-0	1-21	1-19	1-18	1-16	1-9
2,000	10-10	9-6	8-8	7-14	6-23	6-10	5-23	5-13	5-5	4-22	4-15	4-9	4-4	3-23	3-19	3-15	3-11	3-8	2-19
3,000	15-15	13-21	12-12	11-9	10-10	9-15	8-22	8-8	7-20	7-8	6-23	6-14	6-6	5-23	5-16	5-10	5-5	5-0	4-4
4,000	20-20	18-12	16-16	15-4	13-21	12-20	11-22	11-3	10-10	9-19	9-6	8-19	8-8	7-22	7-14	7-6	6-23	6-16	5-13
5,000	26-1	23-4	20-20	18-23	17-9	16-1	14-21	13-21	13-1	12-6	11-14	10-23	10-10	9-22	9-11	9-1	8-16	8-8	6-23
6,000	31-6	27-19	25-0	22-17	20-20	19-6	17-21	16-16	15-15	14-17	13-21	13-4	12-12	11-22	11-9	10-21	10-10	10-0	8-8

INDEX

The numbers of the largest scale charts on which the names appear follow the indexed items. Some geographic names are indexed more than once when more than one place has the same geographic name. Charts published by the Defense Mapping Agency Hydrographic/Topographic Center are indicated by an asterisk.

	Page
Abalone Point 18620	225
Abbey Islet 18480	282
Aberdeen 18502	279
Abernathy Point 18523	259
Acceptable Vessel Watering Points	7
Active Cove 18431	301
Active Pass 18421	301
Adams Bay 19016	419
Adams Cove 18727	160
Administrative Procedure	113
Admiralty Bay 18441	325
Admiralty Head 18441	297, 325
Admiralty Inlet 18441	325
Agate Bay 18465	294
Agate Passage 18446	353
Agate Point 18446	354
Ahihi Bay 19347	389
Ahole Rock 19340	388
Ahukini Landing 19384	417
Aids to navigation	17, 114
Air Almanac	433
Aircraft procedures for directing surface craft to scene of distress incident	10
Akoakoa Point 19327	375
Ala Wai Boat Harbor 19364	401
Alala Point 19357	410
Alalakeiki Channel 19347	394
Alameda 18650	192
Alameda Naval Air Station 18650	192
Alamitos Bay 18749	133
Alapii Point 19381	415
Alau Island 19340	388
Albany	268
Albert Head 18465	292
Albion 18628	224
Albion Cove 18628	223
Albion River 18628	224
Alcatraz Island 18650	183
Alcatraz Light 18650	183
Alden Bank 18421, 18431	312
Alden Point 18431	301
Alder Creek 18700	166
Alealea Point 19324	376
Aleck Bay 18429, 18421	308
Alenuihaha Channel 19320	387
Alexander Island 18480	282
Alki Point 18449	328
Allan Island 18427	311
Allegany	243
Allyn 18448	368
Aloha Tower 19367	402
Alsea Bay 18561	246
Aluea Rock 19340	393
American Ephemeris and Nautical Almanac	433
American Practical Navigator (Bowditch)	433
American Samoa 83484	431
Amphitrite Point 18480	285
Anacapa Island 18729	157
Anacapa Passage 18729	158
Anacortes 18427	313
Anaheim Bay 18749	132
Anahola Bay 19381	416
Anahulu River 19357	408
Anchorage Grounds	35
Anchorage Regulations	29
Anchorages	115
Anderson Cliff 18620	226
Anderson Cove 18448	353
Anderson Cove 18449	356
Anderson Island 18448	366
Anderson Point 18485	284
Angel Island 18649	202
Angeles Point 18465	294
Animal and Plant Health Inspection Service	3
Animal Import Centers	438
Anita Rock 18650	184
Annapolis 18452	355
Annas Bay 18448	353
Annexation Hill 19016	422
Antioch 18659	210
Antioch Bridge 18661	211
Apole Point 19340	389
Apple Cove Point 18446	326
Appletree Cove 18446	326
Aptos Creek 18685	170
Apua Point 19320	379
Aquatic Park 18650	187
Arcadia 18457	370
Arcata 18622	229
Arcata Bay 18622	229
Arch Cape 18520	251
Arch Rock 18729	157
Arena Cove 18640	222
Arena Rock 18640	223
Arlington 18536	272
Army Point 18657	209
Arroyo San Onofre 18774	130
Astoria 18521	258
Atlas Rock 18704	163
Atolls	419
Attalia 18542	273
Auau Channel 19347	394
Auau Point 19320	381
Austin Point 18524	262
Automated Mutual-assistance Vessel Rescue System (AMVER)	4
Avalon 18759	155
Avalon Bay 18759	155
Avila Beach 18704	163
Avon 18657	209
Ayala Cove 18649	202
Baadah Point 18484	293
Baby Island 18441	347
Bachelor Island 18524	263
Back Channel 18751	135
Bahokus Peak 18485	284
Bainbridge Island 18446, 18449	327, 353
Bainbridge Reef 18449	354
Baker Bay 18521	256
Baker Island 83116	431
Balboa 18754	131
Balch Passage 18448	365
Bald Hill 18620	225

BEST DOCUMENT AVAILABLE

Page
Bald Mountain 18601 ... 238
Ballast Point 18759 ... 156
Ballast Point 18773 ... 125
Ballena Bay Yacht Harbor 18650, 18652 ... 192
Ballenas Islands 18400 ... 321
Baltimore Rock 18587 ... 240
Bandon 18588 ... 239
Bangor 18458 ... 352
Bangor Wharf 18458 ... 352
Barbers Point 19362 ... 406
Barbers Point Light 19362 ... 406
Bare Island 18431 ... 301
Barking Sands 19381 ... 415
Barkley Sound 18480 ... 285
Barlow Bay 18421 ... 303
Barnes Island 18421 ... 312
Barren Island 18433 ... 300
Barview 18587 ... 242
Bat Rock 18727 ... 160
Bathhouse Point 18759 ... 155
Battery Point 18603 ... 233
Battle Point 18446 ... 354
Battle Rock 18589 ... 238
Battleship Island 18433 ... 300
Bay Center 18504 ... 277
Bay City 18502 ... 279
Bay City 18558 ... 250
Bay City Channel 18558 ... 250
Bay View 18427 ... 315
Beacon Reef 18728 ... 159
Beacon Rock 18531 ... 270
Beans Point 18449 ... 355
Bear Harbor Ridge 18620 ... 226
Bear River 18504 ... 277
Bearings ... 1
Beaver Slough 18523 ... 260
Bechers Bay 18728 ... 159
Beck Cove 19347 ... 394
Bee 18448 ... 366
Bee Rock 18727 ... 159
Beechey Head 18465 ... 292
Begg Rock 18755 ... 157
Bell Island 18425 ... 306
Belle Chain Islets 18421 ... 320
Belle Rock 18429, 18421 ... 311
Bellevue Point 18433 ... 300
Bellingham 18424 ... 315
Bellingham Bay 18424 ... 315
Bellingham Channel 18424 ... 315
Bells Mountain 18620 ... 225
Belvedere Cove 18649 ... 202
Ben Ure Island 18427 ... 311
Ben Ure Spit 18427 ... 312
Benicia 18657 ... 209
Benicia Point 18657 ... 207
Bentinck Island 18465 ... 292
Berkeley 18649 ... 196
Berkeley Reef 18649 ... 196
Berkeley Yacht Harbor 18649 ... 196
Bethel Island (Bethel Tract) 18661 ... 211
Big Flat 18620 ... 226
Big Lagoon 18600 ... 232
Big River 18628 ... 224
Big Sur River 18686 ... 167
Big White Rock 18620 ... 226
Biggs 18533 ... 272
Biggs Bridge 18533 ... 272
Biggs Junction 18533 ... 272
Bingen 18531 ... 271
Birch Bay 18421 ... 318
Birch Point 18421 ... 318
Bird Island 19461 ... 429
Bird Rock 18425 ... 306
Bird Rock 18700 ... 166
Bird Rock 18759 ... 156
Bird Rocks 18429, 18421 ... 311
Bishop Rock 18740 ... 153
Bit Rock 18744 ... 144
Bixby Landing 18686 ... 168
Biz Point 18429, 18427 ... 311

Page
Black Rock 18430 ... 311
Black Rock 18589 ... 239
Black Rock 19361 ... 407
Blacklock Point 18589 ... 239
Blaine 18421 ... 319
Blaine Harbor 18421 ... 319
Blair Waterway 18453 ... 362
Blake Island 18449 ... 356
Blakely Harbor 18449 ... 328
Blakely Island 18430 ... 307
Blakely Rock 18449 ... 328
Blanco Reef 18589 ... 239
Blank Rock 18605 ... 232
Blind Bay 18425 ... 307
Blind Island 18425 ... 307
Blonde Reef 19324 ... 377
Blowers Bluff 18441 ... 347
Bluff Cove 18744 ... 144
Bluff Point 18649 ... 203
Blunts Reef 18623 ... 228
Boardman 18537 ... 272
Bodega Bay 18643 ... 221
Bodega Harbor 18643 ... 221
Bodega Head 18643 ... 221
Bodega Rock 18643 ... 221
Bodelteh Islands 18485 ... 284
Bolinas Bay 18649 ... 178
Bolinas Lagoon 18649 ... 178
Bolinas Point 18647 ... 178
Bonilla Point 18460 ... 291
Bonita Channel 18649 ... 179
Bonita Cove 18649 ... 178
Bonita Cove 18765 ... 129
Bonneville 18531 ... 270
Bonneville Lock and Dam 18531 ... 270
Bosley Butte 18600 ... 236
Boston Harbor 18456 ... 368
Boulder Reef 18421 ... 312
Boundary Bay 18400 ... 319
Boundary Bluff 18400 ... 319
Boundary Pass 18432 ... 298
Bourns Landing 18640 ... 222
Bowman (Reservation) Bay 18429, 18427 ... 311
Brackenridge Bluff 18502 ... 278
Bradbury Slough 18523 ... 260
Bradford Island 18531 ... 270
Brazos 18654 ... 207
Breaker Point 18700 ... 166
Bremerton 18452 ... 356
Bridge and cable clearances ... 15
Bridge lights and clearance gages ... 18
Bridge of the Gods 18531 ... 271
Bridge-to-Bridge Radiotelephone Communication ... 25
Bridges ... 1
Brighton 18556 ... 251
Brinnon 18458 ... 352
Brisco Point 18456 ... 368
Brockway Point 18728 ... 159
Broken Point 18425 ... 307
Brookings 18602 ... 235
Brooks Banks 19019 ... 425
Brotchie Ledge 18465 ... 292
Brown Island 18425 ... 305
Brown Rock 18603 ... 234
Browns Point Light 18453 ... 359
Brownsville 18446 ... 354
Brushy Bald Mountain 18601 ... 237
Buck Bay 18430 ... 307
Buckeye Shoal 18430 ... 312
Bucksport 18622 ... 229
Budd Inlet 18456 ... 368
Buena Vista ... 268
Buhne Point 18622 ... 229
Bull Island 18654 ... 207
Bull Rock 18628 ... 223
Bulls Head Point 18657 ... 209
Buoys ... 19
Burbank 18545 ... 273
Burke Bay 18446 ... 354
Burke Island 18524 ... 260

Page
Burke Slough 18524 262
Burley Lagoon 18448 366
Burns Point 18448 370
Burrard Inlet 18400 320
Burrows Bay 18429, 18427 311
Burrows Island 18429, 18427 311
Burrows Island Light 18429, 18427 311
Burton 18448 358
Burton Peninsula 18448 358
Bush Point 18441 325
Butteville 18528 268

Cable ferries 1, 211
Cables 1
Cabrillo National Monument 18772 125
Cabrillo Peninsula 18759 155
Cache Slough 18661, 18662 215
Cadboro Point 18433 301
Cahto Peak 18620 225
Cake Rock 18480 283
Calaveras Point 18651 192
California State Maritime Academy 18655 207
Camano 18441 347
Camano Head 18443 347
Camano Island 18441 347
Camas 18531 270
Camas Slough 18531 270
Cambria 18700 165
Cambria Rock 18700 165
Can Rock 18727 160
Canada de la Gaviota 18721 151
Candlestick Point 18651 188
Cannery Hill 18583 244
Canoe Island 18425 306
Canoe Pass 18427 308
Cap Sante (Capsante) Waterway 18427 313
Cape Alava 18460, 18485 284
Cape Arago 18580 240
Cape Arago Light 18580 240
Cape Beale 18480 285
Cape Blanco 18589 239
Cape Blanco Light 18589 239
Cape Disappointment 18521 254
Cape Elizabeth 18500 281
Cape Falcon 18520 251
Cape Ferrelo 18602 236
Cape Flattery 18485 284
Cape Flattery Light 18485 285
Cape Foulweather 18561 248
Cape George 18467 297
Cape Halawa 19347 397
Cape Hanamanioa 19347 389
Cape Horn 18523 259
Cape Horn 18531 270
Cape Horn of the Pacific 151
Cape Johnson 18480 283
Cape Kinau 19347 389
Cape Kiwanda 18520 249
Cape Kuikui 19347 394
Cape Kumukahi Light 19320 378
Cape Lookout 18520 249
Cape Meares 18558 250
Cape Meares Light 18558 250
Cape Mendocino 18623 227
Cape Perpetua 18580 245
Cape San Martin 18700 166
Cape Sebastian 18601 237
Cape Shoalwater 18504 275
Cape St. Mary 18429, 18421 311
Cape Vizcaino 18620 225
Capitan 18721 151
Capitola 18685 170
Cardwell Point 18727 160
Carlsbad 18774 129
Carlyon Beach 18448 369
Carmanah Point 18460 285
Carmel 18686 168
Carmel Bay 18686 168
Carmel Canyon 18686 168
Carmel River 18686 168

Page
Carpinteria 18725 150
Carquinez Strait 18656 207
Carr Inlet 18448 366
Carrington Point 18728 159
Carroll Island 18480 284
Carrolls Channel 18524 262
Carter Point 18421 312
Carter Point 18424 315
Carter Point 19383 411
Cascade Bay 18430 307
Cascade Head 18520 249
Cascade Locks 18531 271
Case Inlet 18448 367
Case Shoal 18461 351
Casino Point 18759 155
Casket Rock 18626 223
Caspar 18628 224
Caspar Anchorage 18628 224
Caspar Creek 18628 224
Castle Rock 18520 251
Castle Rock 18589 239
Castle Rock 18603 234
Castle Rock 18727 160
Castle Rock 18763 154
Castro Point 18649 202
Castro Rocks 18649 196
Cat Rock 18729 158
Catalina Harbor 18759 156
Catalina Head 18759 156
Catching Slough 18587 243
Cathlamet 18523 260
Cathlamet Bay 18521 259
Cathlamet Channel 18523 260
Cattle Point 18421 303
Cayucos 18703 165
Cayucos Point 18703 165
Center Island 18429, 18421 308
Center Reef 18433, 18425 300
Centerville Beach 18620 228
Central Basin 18650 187
Cerantes Rocks 18460 291
Cerritos Channel 18751 135
Channel Islands 18022 153
Channel Islands Harbor 18725 148
Channel Islands National Marine Sanctuary 18022 153
Channel Islands National Monument 18740 157
Channel markers, caution 19
Channel Street 18650 186
Channels 114
Charles Island 18421 303
Charleston Boat Basin 18587 242
Chart Datum 14
Chart symbols and abbreviations 14
Chase Ledge 18603 233
Chehalis River 18502 279
Cherry Cove 18759 156
Cherry Point 18421, 18431 318
Chetco Cove 18602 235
Chetco Point 18602 235
Chetco River 18602 235
Chico 18449 356
Chimney Rock 18647 178
China Basin 18650 186
China Point 18764 154
Chinese Harbor 18729 158
Chinook 18521 257
Christmas Rock 18623 227
Chuckanut Bay 18424 315
Chuckanut Island 18424 315
Chula Vista 18772 125
City of Refuge 19332 381
City of Seattle Rock 18427 313
City Waterway 18453 362
Clallam Bay 18460 294
Clark Island 18421 312
Clark Point 18424 315
Clarksburg 18662 217
Clarkston 18548 273
Clatskanie 18523 260
Clatskanie River 18523 260

	Page
Clatsop Spit 18521	254
Cleawox Lake 18580	244
Clements Reef 18421, 18431	301
Cliff House 18649	179
Cliff Island 18425	306
Clinton 18443	345
Clo-oose 18460	285
Clover Island 18542	274
Clover Point 18465	293
Cluster Cone Rock 18620	226
Coal Creek Slough 18524	260
Coal Oil Point 18721	151
Coalbank Slough 18587	243
Coast Eddy Current	180
Coast Guard	4
Coast Guard Captains of the Port	434
Coast Guard District Offices	434
Coast Guard Documentation Offices	434
Coast Guard droppable, floatable pumps	12
Coast Guard Marine Safety Offices	434
Coast Guard Radio Broadcasts	435
Coast Guard radio stations	13
Coast Guard Recreational Boating Guide	433
Coast Guard Stations	434
Coast Guard vessels, warning signals	22
Coast Pilots	1, 432
Coastal Warning Display	8
Cocoanut Island 19324	377
Cojo Anchorage 18721	151
Colby Reef 18628	224
Cole Island 18465	292
Cole Point 18448	367
Colebrooke Butte 18601	238
Colorado River	152
COLREGS Demarcation Lines	27, 114
Columbia City 18524	262
Columbia Park Recreation Area	274
Columbia River 18003	253
Columbia River Approach Lighted Horn Buoy CR 18521	253
Columbia River Datum	254
Columbia River Gorge 18531	270
Columbia Slough 18526	263
Colville Island 18429, 18421	308
Colvos Passage 18448	359
Colvos Rocks 18461	325
Commencement Bay 18453	359
Commercial Basin 18773	128
Compass roses on charts	16
Concord U.S. Naval Weapons Station 18658	210
Cone Islands 18424	315
Cone Peak 18700	167
Cone Rock 18600	232
Cone Rock 18602	234
Conical Rock 18623	227
Constance Bank 18465	292
Constantine Rock 18703	165
Control of shipping in time of emergency or war	24
Conway 18400	348
Cook 18531	271
Cook's Monument 19332	382
Coon Bay 18461	351
Coon Island 18425	306
Cooper Point 18448	369
Cooper Point 18686	167
Coos Bay 18587	240, 243
Coos Head 18587	240
Coos River 18587	243
Cooskie Creek 18620	227
Copalis Head 18500	280
Copalis River 18500	280
Copalis Rocks 18500	280
Copeleys Rock 18528	267
Coquille 18580	240
Coquille Point 18588	239
Coquille River 18588	239
Coquille Rock 18588	239
Corbett 18531	270
Cordell Bank 18645	177
Cormorant Passage 18448	367
Cornet Bay 18427	311
Corona Del Mar 18754	131
Coronado 18773	125
Corps of Engineers	5
Corps of Engineers Offices	433
Corte Madera Creek 18649	203
Cortes Bank 18740	153
Corvallis	268
Cosmopolis 18502	279
Cottaneva Needle 18620	225
Cottaneva Rock 18620	225
Cottons Point 18774	130
Cottonwood Island 18524	260
Coupeville 18441	347
Courses	1
Courtland 18662	217
Cove 18448	359
Cowlitz Bay 18432	301
Cowlitz River 18524	261
Cox Rock 18580	245
Coxcomb Hill 18521	257
Coyote Creek 18651	192
Coyote Point 18651	188
Crane Island 18425	305
Crashboat Channel 19359	409
Crates Point 18531	271
Creosote 18449	328
Crescent Bay 18465	294
Crescent City 18603	233
Crescent City Harbor 18603	233
Crescent City Outer Breakwater Light 5 18603	233
Crescent Harbor 18428	348
Crescent Rock 18465	294
Crims Island 18523	259
Crockett 18655	207
Crook Point 18602	236
Crook Point 18727	160
Cruising schedules	13
Cuffey Cove 18626	223
Cuffey Inlet 18626	223
Cultus Bay 18441	326
Currents	1
Cushman 18583	245
Customs Ports of Entry	436
Customs Service	3
Cutler City 18520	248
Cutts Island 18448	366
Cuyler Harbor 18727	160
Cypress Island 18430	311
Cypress Point 18686	168
Cypress Point Rock 18686	168
Cypress Reef 18430	312
Dabob Bay 18458	352
Dallas Bank 18467	297
Dana Passage 18456	368
Dana Point 18746	131
Dana Point Harbor 18746	131
Danger Rock 18432	306
Danger Shoal 18433	300
Danger signal	24
Danger Zone Regulations	86
Danger zones	116
Dangers	115
Dash Point 18453	359
Davenport 18680	171
Davidson Inshore Current	117
Davidson Rock 18429, 18421	308
Davis Point 18421	303
Davis Point 18654	206
Davis Slough 18441	347
Daylight saving time	374
Days Island 18448	365
Days Island Lagoon 18448	365
Deadman Island 18421	303
Decatur 18429, 18421	308
Decatur Head 18430	311
Decatur Island 18429, 18421	308
Decatur Reef 18449	328
Deception Island 18429, 18427	308

Page
Deception Pass 18429, 18427 308
Deck officers 24
Decker Island 18661 213
Deep River 18521 259
Deer Harbor 18425 305
Deer Island Slough 18524 262
Defense Mapping Agency
Hydrographic/Topographic Center (DMAHTC) 6
Del Mar 18765 129
Del Mar Boat Basin (Camp Pendleton) 18774 130
Delgada Canyon 18620 226
Dellwood 243
Delta Region 18661, 18662 210
Dennis Shoal 18427 311
Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) Offices 437
Depoe Bay 18561 248
Depot Slough 18581 248
Depths 1
Des Moines 18448 358
Deschutes River 18533 272
Desdemona Sands 18521 257
Destruction Island 18500 282
Destructive waves 21
Devils Gate Rock 18623 227
Devils Head 18448 367
Devils Lake 18520 249
Devils Slide 18680 172
Dewatto 18448 353
Dewatto Bay 18448 353
Diablo Canyon 18703 164
Diamond Head 19358 401
Diamond Point 18467 297
Dibblee Point 18524 260
Dillon Point 18657 207
Dinner Island 18421 303
Discovery Bay 18467 297
Discovery Island 18465 293
Disposal areas 16
Distances 2
Distress Assistance and Coordination Procedures 10
Distress Signals and Communication Procedures 8
Dockton 18448 359
Documentation 5
Doe Bay 18430 312
Doe Bay (Doebay) 18430 312
Dofflemyer Point 18456 368
Dolan Cone 18700 167
Dolphin Cove 18626 224
Dolphin Point 18449 358
Double Bluff 18441 325
Double Cone Rock 18620 225
Double Island 18425 307
Double Peak 18520 252
Double Point 18647 178
Dragon Channel 18603 234
Drakes Bay 18647 178
Drano Lake 18531 271
Drawbridge Operation Regulations 49
Drayton Harbor 18421 319
Drayton Passage 18448 367
Dtokoah Point 18484 293
Duck Club 18524 263
Dumas Cove 18448 358
Dumbarton Point 18651 188
Dume Canyon 18744 146
Dump Sites 16, 114
Dumping Grounds 16, 114
Duncan Rock 18485 285
Duncans Landing 18640 222
Dungeness 18465 297
Dungeness Bay 18465 296
Dungeness Spit 18465 296
Duntze Rock 18485 285
Duwamish Head 18449 331
Duwamish Waterway 18450 331
Duxbury Point 18647 178
Duxbury Reef 18647 178
Dyes Inlet 18449 356

Page
Eagle Creek 18531 271
Eagle Harbor 18449 328
Eagle Island 18448 367
Eagle Island Reef 18448 367
Eagle Point 18421 300
Eagle Reef 18759 156
Eagledale 18449 328
East Basin Channel 18751 135
East Bremerton 18452 355
East Brother Island Light 18649 202
East Fish Camp 18729 158
East Island 19402 425
East Loch 19357 406
East Pasco 18545 273
East Passage 18448, 18449 356
East Point 18431 303
East Point 18441 347
East Point 18728 159
East Rock 18603 234
East Sound 18430 307
East Waterway 18450 331
Eastern Island 19481 429
Eastsound 18430 307
Eaton's Ranch 18504 277
Ebey Slough 18443 346
Echo Bay 18421, 18431 301
Echo soundings 16
Ecola Creek 18520 252
Edith Point 18421 320
Ediz Hook 18468 295
Ediz Hook Light 18468 295
Edmonds 18446 327
Edwards Point 18446 326
Eel Canyon 18620 228
Eel River 18620 228
El Estero 18725 149
El Segundo 18744 145
Eld Inlet 18448 369
Eldon 18448 353
Electronic navigation 114
Elger Bay 18441 347
Eliza Island 18424 315
Eliza Rock 18424 315
Elk 18626 223
Elk River 18502 279
Elk River 18589 238
Elk Rock 18640 223
Elliot Cove 18655 207
Elliot Point 18443 345
Elliott Bay 18449 328
Ellis Slough 18504 276
Ellwood 18721 151
Elma 18502 279
Elochoman Slough 18523 259
Elwha River 18465 294
Elwood Point 18452 356
Emeryville 18649 196
Empire 18587 243
Empire Cut 18661 214
Encinal Basin 18650 192
English Bluff 18400 319
Enterprise Reef 18421 301
Entrance Island 18400 321
Enuhe Ridge 19320 379
Environmental Data and Information Service (EDIS) 8
Environmental Protection Agency (EPA) 6
Environmental Protection Agency (EPA) Offices 434
Espada Bluff 18721 151
Esquimalt Harbor 18465 292
Estero Bay 18703 164
Eureka 18622 229
Everett 18444 345
Everett Yacht Harbor 18444 346
Evergreen Point 18447 341
Ewa 19362 406

Fair Harbor 18448 368
Fairbank Point 18703 165
Fairhaven 18622 229
Fairway Channel 18400 321

	Page
Falcon Rock 18520	251
False Cape 18623	228
False Cape Rock 18623	228
False Klamath Rock 18600	233
False Point 18765	129
False Sur 18686	167
Fanny Shoal 18645	177
Farallon Islands 18645	177
Farallon Light 18645	177
Farnsworth Bank 18757	155
Father and Son 18485	284
Fauntleroy Cove 18449	356
Fauntleroy Point 18430	308
Fawn Island 18425	305
Feather River 18664	219
Federal Communications Commission	6
Federal Communications Commission Offices	438
Ferndale 18421, 18431	318
Ferry Building 18650	184
Fidalgo Bay 18427	314
Fidalgo Head 18429, 18427	311
Fidalgo Island 18429, 18427	308
Fields Landing 18622	229
Filucy Bay 18448	367
Fisgard Island 18465	292
Fish Harbor 18751	135
Fish havens	6, 16, 116
Fish Rocks 18640	222
Fishboat Harbor 18603	234
Fisher Island 18524	260
Fisher Island Slough 18524	260
Fisherman Bay 18421	303
Fisherman Bay 18640	222
Fisherman Bay 18645	177
Fisherman Cove 18759	156
Fisherman Harbor 18458	352
Fisherman's Wharf 18650	187
Fishtrap areas	16
Fishtraps	6
Fisk Mill Cove 18640	222
Five Needles 19351	396
Fivemile Point 18580	240
Flat Point 18425	306
Flat Rock 18500	281
Flat Rock 18603	234
Flat Rock 18605	232
Flat Rock 18744	144
Flat Rock Point 18744	144
Flatiron Rock 18605	232
Flattery Rocks 18485	284
Flattop Island 18425	306
Fletcher Bay 18449	354
Flint Rock Head 18600	233
Florence 18583	245
Flounder Bay 18429, 18427	311
Fog signals	18
Food and Drug Administration (FDA)	7
Food and Drug Administration (FDA) Regional Offices	437
Forbes Point 18428	348
Foreign-Trade Zones	3, 436
Forney Cove 18728	158
Fort Bragg 18626	225
Fort Mason 18650	187
Fort Point 18649	179
Fort Ross 18640	222
Fort Ross Cove 18640	222
Fort Ross Reef 18640	222
Fort Stevens Wharf 18521	257
Fort Ward 18449	355
Fortmann Basin 18650	192
Fossil Bay 18421, 18431	301
Foulweather Bluff 18461	325
Fourmile Rock 18447	331
Fourth of July Cove 18759	156
Fox Island 18448	366
Fox Rock 18589	238
Fragaria 18448	359
Franklin D. Roosevelt Lake 18551, 18553	274
Fraser River 18400	320
Freeland 18441	347
Freeport 18662	217
French Frigate Shoals 19401, 19402	422
Frequency units	13
Freshwater Bay 18465	294
Friday Harbor 18425	305
Fuca Pillar 18485	284
Fulton Creek 18441	353
Gabriola Pass 18400	321
Gabriola Reefs 18400	321
Galiano Island 18400	320
Gambia Shoal 19022	429
Garcia River 18640	223
Gardiner 18584	244
Gardner Pinnacles 19421	425
Garibaldi 18558	250
Garrison Bay 18433	300
Gaviota 18721	151
Gedney Island 18443	345
Geographic range	17
Georgiana Slough 18661	214
Gertrude 18448	366
Gertrude Island 18448	366
Giants Graveyard 18480	282
Gibson Point 18448	366
Gig Harbor 18448	359
Glen Cove 18464	323, 324
Glenada 18583	245
Glencove 18448	366
Glendale 18441	345
Glorietta Bay 18773	128
Goat Island 18427	313
Goat Island 18602	236
Gold Beach 18601	237
Gold Bluffs 18600	232
Golden Gate 18649	179
Golden Gate Bridge 18649	179
Goleta 18721	151
Goleta Point 18721	151
Gonzales Point 18465	293
Goose Island 18421	303
Goose Point 18504	277
Gooseberry Point 18424	315
Gorda Rock 18623	227
Gordon Hill 18620	225
Government Agencies	3
Government Cove 18531	271
Governors Point 18424	315
Gowlland Point 18432	303
Grand Coulee Dam 18551	274
Grapeview 18448	368
Graveyard Point 18587	243
Graveyard Point 18589	238
Grays Bay 18521	259
Grays Harbor 18502	278
Grays Harbor Light 18502	278
Grays Point 18521	259
Grays River 18521	259
Great Break 18603	234
Great Crack 19320	379
Green Hill 18558	250
Green Island 19483	430
Green Point 18425	300
Green Rock 18600	232
Greenbank 18441	347
Grenville Arch 18500	281
Guadalupe Slough 18651	192
Gualala 18640	222
Gualala Mountain 18640	222
Gualala Point 18640	222
Gualala River 18640	222
Guam 81048, 81054	431
Guano Rock 18587	241
Guemes Channel 18427	313
Gulf of the Farallones 18645	175
Gull Island 18523	259
Gull Island 18728	158
Gull Rock 18425	306
Gull Rock 18561	248

Page
Gull Rock 18589 239
Gull Rock 18640 221

Hadlock 18464 324
Haena Caves 19385 415
Haena Point 19385 415
Hakalau Bay 19320 376
Hakalau Gulch 19320 376
Hakubee Point 19342 391
Hakuma Point 19320 379
Halawa 19347 400
Halawa Bay 19347 400
Hale Passage 18424 315
Hale Passage 18448 366
Haleakala 19340 387
Haleili 19320 381
Haleiwa 19357 408
Haleiwa Small-Boat Harbor 19357 408
Haleolono Point 19351 399
Half Moon Bay 18682 172
Halona Point 19347 394
Hamma Hamma River 18448 353
Hammersley Inlet 18457 370
Hammond 18521 257
Hana 19341 388
Hana Airport 19340 394
Hana Bay 19341 388
Hanakaoo Point 19348 391
Hanalei 19385 415
Hanalei Bay 19385 415
Hanalei River 19385 415
Hanamalo Point 19320 381
Hanamanioa Light 19347 389
Hanamaulu Bay 19384 417
Hanamaulu Stream 19384 417
Hanapepe Bay 19382 413
Hanapepe Bay Breakwater Light 19382 413
Hanauma Bay 19358 401
Hanbury Point 18433 300
Hand Rock 18480 284
Hanford Works 274
Hansville 18461 326
Harbor Island 18450 331
Harbor Island 18773 128
Harbor Island West Basin 18773 128
Harbor Reefs 18759 156
Harbor Rock 18421 303
Harbor Rock 18425 307
Harbormasters and wharfingers 122
Harding Rock 18650 184
Hardy Rock 18620 225
Harlan Rock 18700 167
Harlech Castle Rock 18700 166
Harney Channel 18425 307
Haro Strait 18433, 18432 298
Haro Strait and Strait of Georgia Traffic Separation
  Scheme 18400 288
Harper 18448 356
Harrington Point 18521 259
Harrington Point 18523 259
Harris Point 18727 160
Hartstene Island 18448 367
Hat Rock State Park 18541 272
Hauakea Pali 19351 399
Hauola Gulch 19347 396
Haupu 19381 411
Hauula 19357 409
Havens Anchorage 18640 222
Havens Neck 18640 222
Hawaii 540 371
Hawaii Island 19320 374
Hawaiian Islands 540 371
Hawaiian Islands National Wildlife Refuge 540 418
Hawea Point Light 19347 391
Hayden Island 18526 268
Haynes Inlet 18587 243
Haystack Landing 18654 206
Haystack Rock 18520 .... 249, 252
Hazel Point 18458 352
Hearst Castle 18700 166

Page
Heceta Bank 18580 245
Heceta Head 18580 245
Heceta Head Light 18580 245
Heeia Kea Small-Boat Harbor 19359 410
Heights 2
Hein Bank 18421 293
Hekili Point 19347 390
Helicopter evacuation 12
Henderson Inlet 18448 367
Henry Island 18433 300
Hermosa Beach 18744 145
Herron 18448 368
Herron Island 18448 368
High Bluff 18600 232
Hilea 19320 379
Hilo 19324 376
Hilo Bay 19324 376
Hiram M. Chittenden Locks 18447 340
Hoalua Bay 19340 393
Hoanuanu Bay 19386 414
Hog (Rocky) Island 18528 267
Hoh Head 18480 282
Hoh River 18480 282
Hokukano 19340 389
Hole in the Wall 18427 313
Holiday Harbor 18583 245
Hollister Peak 18700 164
Holly 18448 353
Holmes Harbor 18441 347
Home 18448 366
Home Valley 18531 271
Honaunau Bay 19332 381
Honohina 19320 376
Honokaa 19322 375
Honokala Point 19340 393
Honokane Iki Stream 19320 375
Honokoa Gulch 19330 384
Honokohau 19347 391
Honokohau Bay 19327 384
Honokohau Small-Boat Harbor 19327 .... 380, 384
Honokohau Stream 19347 391
Honolua Bay 19347 391
Honolulu 19367, 19364 402
Honolulu Entrance Channel 19367 402
Honolulu Harbor 19367, 19364, 19362 402
Honolulu Harbor Entrance Light 19367 402
Honomanu Bay 19340 393
Honomu 19320 376
Honoulimaloo 19347 397
Honouliwai 19347 397
Honuapo Bay 19322 380
Hood Canal 18440 348
Hood Canal Bridge 18461 351
Hood Head 18461 351
Hood River 18531 271
Hoodsport 18448 353
Hookena 19320 381
Hoopuloa 19320 381
Hoover Dam 18687 152
Hope Island 18427 312
Hope Island 18448 369
Hoquarten Slough 18558 250
Hoquiam 18502 279
Hoquiam River 18502 280
Horsehead Bay 18448 366
Horseshoe Bay 18649 202
Horseshoe Bend 18654 207
Horseshoe Point 18640 222
Houghton 18447 341
Howell Rock 18704 163
Howland Island 83116 431
Hoypus Point 18427 311
Hualalai 19327 .... 374, 382
Huelo 19340 393
Huelo Point 19340 393
Hueneme Canyon 18720 161
Hueneme Canyon 18725 147
Hug Point 18520 252
Huleia Stream 19383 411
Hulopoe Bay 19347 395

	Page
Hulu Island 19342	391
Humboldt Bar 18622	229
Humboldt Bay 18622	228
Humboldt Bay Light 18622	229
Humbug Mountain 18589	238
Hump Island 18524	260
Hump Rock 18603	234
Hunter Creek 18601	237
Hunter Rock 18602	234
Hunters Cove 18602	237
Hunters Island 18602	237
Hunters Point 18650	187
Hunting Islands 18523	259
Huntington Beach 18746	132
Huntington Beach State Park 18746	132
Huntington Harbour 18749	133
Hurst Shoal 18645	177
Hyde Point 18448	366
Hylebos Waterway 18453	362
I and J Street Waterway 18424	316
Iao Valley 19342	391
Ice Harbor Lock and Dam 18545	273
Iceberg Point 18421	303
Ida Island 18661	217
Ilio Point 19351	399
Illahee 18449	354
Illahee State Park 18449	354
Ilwaco 18521	257
Immigration and Naturalization Service	6
Immigration and Naturalization Service Offices	438
Imola 18654	207
Imperial Eagle Channel 18480	285
Independence	268
Indian Cove 18425	307
Indian Island 18464	324
Indian Island 18622	229
Indianola 18446	327
Inland Waterways Navigation Regulations	77
Inner Harbor 18751	135
Inner Pinnacle Rock 19341	388
International Boundary 18421	319
International Code of Signals	433
International distress signals	8
Invincible Rock 18649	202
Ioleau 19381	413
Ione Reef 18531	270
Iron Mountain 18561	248
Irondale 18464	324
Islais Creek 18650	186
Island Grissom 18751	136
Island Knob 18620	225
Island Rock 18589	238
Isleton 18661	217
Isthmus Cove 18759	155
Isthmus Slough 18587	243
Itsami Ledge 18448	367
Iwiopele 19340	388
Jacks Bend 18654	207
Jackson Pinnacle 18620	226
Jagged Island 18480	284
James Bay 18465	292
James Island 18430	311
James Island 18480	282
Jarvis Island 83116	431
Jenner 18640	222
Jetty 18556	251
Joe Creek 18500	280
John Day Channel 18521	259
John Day Dam 18535	272
John Day Point 18521	259
John Day River 18521	259
John Day River 18535	272
John Day River Recreation Area 18535	272
Johns Island 18432	301
Johns Pass 18432	301
Johns River 18502	279
Johnson Point 18448	367
Johnsons Lee 18728	159

	Page
Jonathan Rock 18603	234
Jones Island 18425	306
Juanita Bay 18447	341
Judge Rock 18727	160
Judith Rock 18727	160
Junipero Serra Peak 18700	167
Ka Lae (South Cape) 19320	380
Kaala 19357	400
Kaalualu Bay 19320	380
Kaapahu Bay 19340	388
Kaawalii Gulch 19320	376
Kaawaloa Cove 19332	382
Kaena Point 19351	396
Kaena Point 19357	407
Kaeo 19380	418
Kahakuloa 19342	391
Kahakuloa Bay 19342	391
Kahakuloa Head 19342	391
Kahala Point 19381	416
Kahaluu 19327	382
Kahana Bay 19357	409
Kahe Point 19357	407
Kahokunui 19347	396
Kahoolawe Island 19347	394
Kahoolawe Southwest Point Light 19347	395
Kahuku 19357	408
Kahuku Point 19357	408
Kahului 19342	392
Kahului Bay 19342	391
Kahului Harbor 19342	391
Kaiaka Bay 19357	408
Kaiaka Point 19357	408
Kaiholena 19320	379
Kaiholena Ridge 19320	379
Kailikii Shoal 19320	380
Kailio Point 19340	389
Kailiu Point 19381	415
Kailua Bay 19331	382
Kailua Bay 19357	410
Kailua Kona 19331	382
Kailua Light 19331	382
Kaimu 19320	379
Kainaliu 19327	382
Kainalu 19347	398
Kaipapau Hill 19357	408
Kaiwi Channel 19340	400
Kaiwi Point 19327	382
Kaka Point 19347	394
Kala Point 18464	324
Kalaeloa Harbor 19347	398
Kalalau Valley 19381	415
Kalaloch Rocks 18500	281
Kalama 18524	262
Kalama River 18524	262
Kalanai Point 19357	408
Kalanipuao Rock 19381	413
Kalanipuu 19383	411
Kalapana 19320	379
Kalaupapa 19351	399
Kalaupapa Peninsula 19351	399
Kalawao 19347	399
Kalepa Ridge 19381	417
Kalepolepo 19350	390
Kalihi Channel 19367	402
Kalihiwai Bay 19385	416
Kalohi Channel 19347	396
Kalua Lapa 19347	389
Kaluaaha 19347	398
Kaluna Cliff 18620	226
Kamaiki Point 19347	395
Kamakou 19340	397
Kamalino 19380	418
Kamalo 19353	398
Kamalo Gulch 19351	398
Kamalo Harbor 19353	398
Kamilo Point 19320	380
Kamohio Bay 19347	394
Kamoi Point 19320	381
Kanaha Rock 19347	397

Page
Kanaka Bay 18433 300
Kanapou Bay 19347 394
Kaneilio Point 19361 407
Kanem Point 18467 297
Kaneohe 19359 410
Kaneohe Bay 19359 409
Kanewaa Point 19320 381
Kanounou Point 19347 391
Kaohikaipu island 19358 410
Kapaa 19381 416
Kapalaoa 19327 384
Kapapa Island 19359 409
Kapua Entrance 19364 401
Kapukaamoi Point 19385 416
Kau Desert 19320 379
Kau District 19320 378
Kauai Channel 19380 410
Kauai Island 19381 410
Kauhako Bay 19320 381
Kauhola Point Light 19327 375
Kauiki Head 19341 388
Kaukalaelae Point 19327 382
Kaula 19380 418
Kaulainaiwi Island 19324 377
Kaulakahi Channel 19380 417
Kaulana Bay 19320 380
Kaumaikeohu Peak 19320 379
Kaumakani 19386 414
Kaumalapau 19351 396
Kaumalapau Harbor 19351 396
Kauna Point 19320 381
Kaunakakai 19353 398
Kaunakakai Harbor 19353 398
Kaunaoa Beach 19330 384
Kaununui Point 19380 418
Kaunuopou Point 19380 417
Kaunuopou Rocks 19380 417
Kaupo Gap 19340 387, 389
Kaupo Landing 19340 388
Kaupulehu 19327 384
Kawaewae 19380 418
Kawai Point 19383 411
Kawaihae 19330 380, 384
Kawaihae Bay 19330 384
Kawaihae Light 19330 384
Kawaihoa Point 19380 418
Kawaikini 19381 410
Kawela 19351 398
Kawela Gulch 19351 398
Kawelikoa Point 19381 412
Kawili Point 19327 384
Keaau 19320 378
Keahole Point 19327 384
Kealaikahiki Channel 19347 395
Kealaikahiki Point 19347 395
Kealakekua Bay 19332 381
Kealia 19320 381
Kealia 19381 416
Kealia Pond 19350 390
Keanae Point 19340 393
Keanae Valley 19340 393
Keanapapa Point 19351 396
Keaoi Island 19320 379
Keauhou 19327 382
Keauhou Bay 19327 382
Keauhou Bay Light 19327 382
Keauhou Landing 19320 379
Keauhou Point 19320 379
Keawaeli Bay 19327 375
Keawakapu 19347 389
Keawanui Bay 19380 418
Keawekaheka Point 19332 382
Keehi Lagoon 19364 405
Keikiwaha Point 19327 382
Kekaa Point 19347 391
Kekaha 19381 414
Kekepa Island 19359 409
Kellers Shelter 18744 146
Kellett Bluff 18433 300
Kellett Ledge 18429, 18421 311

Page
Kelley Point 18526 263
Kelley Point Junction Light 18526 263
Kelp 116
Kelp Reefs 18433 301
Kelso 18524 262
Kennewick 18542 274
Keomuku 19347 396
Keopuka Rock 19340 393
Kepuhi Point 19361 407
Kepuhi Point 19385 415, 416
Kerry 18523 260
Ketron Island 18448 367
Kewalo Basin 19364 402
Keyport 18446 354
Keyport Naval Underwater Warfare Engineering Station (NUWES) 354
Keystone Harbor 18464 325
Kiapot Point 18467 297
Kibesillah Rock 18620 225
Kihei 19350 390
Kihewamoku 19357 408
Kiholo 19327 384
Kiholo Bay 19327 384
Kii Landing 19380 417
Kiikii Stream 19357 408
Kikepa Point 19380 417
Kiket Island 18427 312
Kikiaola Boat Harbor 19386 414
Kikoa Point 19347 395
Kilauea 19320 374, 379
Kilauea 19385 416
Kilauea Bay 19385 416
Kilauea Point 19385 416
Kilauea Stream 19385 416
Kilisut Harbor 18464 324
Kimo Point 19320 380
Kincheloe Point 18558 250
King Harbor 18744 145
King Peak 18620 226
Kingston 18446 326
Kipahulu 19340 388
Kipahulu Valley 19340 388
Klamath 18600 233
Klamath River 18600 233
Klas Rock 18461 325
Klooqueh Rock 18589 238
Koalii 19347 397
Kohala Mill 19327 375
Kohala Mountains 19320 374, 375
Kohala Peninsula 19320 374
Koheo Point 19381 413
Koitlah Point 18485 293
Koko Crater 19358 401
Koko Head 19358 401
Kokole Point 19381 414
Kolekole Gulch 19320 376
Kolo Harbor 19353 399
Koloa 19381 413
Koloa Landing 19381 413
Kolokolo Point 19385 415
Kona Coast 19320 380
Kona weather 373
Koolau Gap 19340 387, 393
Koolau Range 19357 400
Kuaehu Point 19381 416
Kuakamoku Rock 19380 418
Kualoa Point 19359 409
Kuaokala Ridge 19357 407
Kuheia Bay 19347 395
Kuhio Bay 19324 376
Kuhio Park 19381 413
Kuhiwa Gulch 19340 394
Kuia Shoal 19347 395
Kuili 19327 384
Kuilima Point 19357 408
Kukailimoku Point 19331 382
Kukii Point 19383 411
Kukio 19327 384
Kukuihaele 19322 375
Kukuihaele Light 19322 375

Page
Kukuihoolua 19357 408
Kukuiula 19381 413
Kukuiula Bay 19381 413
Kupapau Point 19320 379
Kure Island 19483 430
Kwomais Point 18400 319

La Conner 18427 313
La Cruz Rock 18700 166
La Honda Canyon 18721 162
La Jolla 18765 129
La Perouse Bay 19347 389
La Perouse Pinnacle 19402 422
La Push 18480 282
Laau Point 19351 399
Ladd Seamount 19022 429
Lady Island 18531 270
Lagoon Point 18441 325
Laguna Beach 18746, 18747 131
Laguna Point 18626 225
Lahaina 19348 390
Lahaina Light 19348 390
Lahilahi Point 19361 407
Laie 19357 408
Laie Bay 19357 408
Lake Bryan 18546, 18547 273
Lake Celilo 18533, 18535 271
Lake Earl 18600 234
Lake Mead 18687 152
Lake Pend Oreille 18554 274
Lake River 18524 263
Lake Sacajawea 18545 273
Lake Tahoe 18665 219
Lake Talawa 18600 234
Lake Umatilla 18535, 18539 272
Lake Union 18447 341
Lake Wallula 18541, 18542 272
Lake Washington 18447 341
Lake Washington Ship Canal 18447 340
Lakebay 18448 366
Lamaloa Head 19347 400
Lanai 19340 395
Lanai City 19340 395
Lanaihale 19340 395
Lands End 18649 179
Langley 18441 347
Laniloa 19357 408
Lansing Rock 18704 163
Larabee State Park 18424 315
Launiupoko Point 19347 390
Laupahoehoe 19320 376
Laupahoehoe Point 19320 376
Lavigia Hill 18725 150
Lawai Bay 19381 413
Lawrence Point 18430 311
Lawson Reef 18429, 18421 308
Lawson Rock 18430 308
Laysan Island 19442, 19019 427
Leadbetter Point 18504 275
Leahi Point 19380 418
Leaning Rock 18602 236
Legal public holidays 123
Legoe Bay 18424, 18431 312
Lehua Channel 19380 417
Lehua Island 19380 417
Lehua Rock Light 19380 417
Lehuawehe Bay 19381 416
Leleiwi Point 19320 378
Leo Reef 18430 308
Lepeamoa Rock 19320 381
Lewis and Clark River 18521 257
Lewis River 18524 262
Lewiston 18548 273
Liberty Bay 18446 354
Lieser Point 18531 270
Light and fog signal characteristics 2
Light Lists 5
Light Lists (Foreign Countries) 433
Light Lists (United States and Possessions) 433
Lights 17

Page
Lihue 19381 410
Lilliwaup 18448 353
Lilliwaup Bay 18448 353
Lime Kiln Light 18421 300
Lime Point 18649 179
Limestone Point 18425 306
Lincoln City 18520 248
Lion Rock 18700 163
Lion Rock 18703 164
Lipoa Point 19347 391
Lisabeula 18448 359
Lisianski Island 19442, 19022 428
Little Connection Slough 18661 215
Little Goose Lock and Dam 18546, 18547 273
Little Head 18605 231
Little Island 18421 303
Little River 18620 231
Little River 18628 224
Little River Rock 18605 231
Little Skookum Inlet 18448 370
Little Slate Rock 18700 167
Little Sur River 18686 168
Loa Point 19320 381
Lobos Rocks 18686 168
Local magnetic disturbances 16
Local Notice to Mariners 2
Lofall 18461 351
Logs and deadheads 116
Loma Prieta 18680 171
Lone Black Rock 18703 164
Lone Tree Point 18654 206
Lonesome Cove 18425 306
Long Beach 18751 133
Long Beach Breakwater 18749 135
Long Be nnel 18751 135
Long Beac rbor 18751 134
Long Beach Light 18751 135
Long Beach Marina 18749 133
Long Island 18421 303
Long Island 18504 277
Long Island Shoal 18504 277
Long Point 18746 144
Long Point 18757 155
Long Rock 18603 234
Longbranch 18448 367
Longview 18524 260
Longview Bridge 18524 260
Lono Harbor 19353 399
Lookout Rock 18601 238
Lopez 18421 303
Lopez Hill 18421 303
Lopez Island 18421 303
Lopez Pass 18429, 18421 308
Lopez Point 18700 167
Lopez Rock 18700 167
Lopez Sound 18429, 18421 308
Loran 20, 374
Lord Island 18524 260
Los Angeles 18751 133
Los Angeles Harbor 18751 134
Los Angeles Light 18751 135
Los Angeles Main Channel 18751 135
Los Coronados (Coronado Islands) 18765 124
Low Island 18425 306
Low Point 18465 294
Lowell Point 18441 347
Lower Granite Lock and Dam 18547 273
Lower Monumental Lock and Dam 18545 273
Lualailua Hills 19340 389
Lualuaei Homestead 19361 407
Lulu Island 18400 320
Lumahai River 19385 415
Luminous range 17
Lummi Bay 18421, 18424 318
Lummi Island 18421, 18424 312
Lummi Island 18424 315
Lummi Peak 18421 312
Lummi Point 18424 315
Lummi Rocks 18421 312
Lunada Bay 18744 144

	Page
Lydia Shoal 18430	312
Lyle Point 18448	367
Lynch Cove 18448	353
Maalaea 19350	390
Maalaea Bay 19350	389
Macaulay Point 18465	292
Mack Arch 18602	236
Mack Arch Cove 18602	236
Mack Reef 18602	236
Mackaye Harbor 18421	303
Mad River 18620	231
Magnolia Bluff 18447	328
Mahaiula 19327	384
Mahie Point 19357	409
Mahukona 19329	386
Mahukona Harbor 19329	386
Mahukona Light 19329	386
Maili Point 19357	407
Makaalae Point 19340	388
Makah Bay 18485	284
Makahoa Point 19357	408
Makahoa Point 19385	415
Makahuena Point 19381	412
Makalii Point 19357	409
Makanau 19320	379
Makaokahai Point 19381	413
Makapili Rock 19385	416
Makapuu Head 19358	401
Makena Anchorage 19347	389
Makolea Point 19327	384
Mal Pass 18640	223
Mala 19348	390
Malaga Cove 18744	144
Malibu Beach 18744	146
Maliko Bay 19342	393
Mamala Bay 19364, 19362	402
Mamalu Bay 19340	389
Mana 19381	415
Mana Point 19381	415
Manana Island 19358	410
Mandalay Beach 18725	148
Mandeville Cut 18661	211
Manele Bay 19347	395
Manele Small-Boat Harbor 19347	395
Manhattan Beach 18744	145
Maniania Pali 19320	380
Mano Point 19327	384
Mansfield Break 18603	234
Manzanita 18446	354
Manzanita 18448	358
Manzanita Bay 18446	354
Mapleton 18580	245
March Point 18427	314
Mare Island 18655	206
Mare Island Strait 18655	206
Mare Island U.S. Naval Shipyard	206
Marina 18685	169
Marina del Rey 18744	145
Marine Broadcast Notices to Mariners	2
Marine Radio Telephony	433
Marine Weather Services Charts	433
Mariners Basin 18765	129
Markham 18502	279
Maro Reef 19441	427
Marrowstone Island 18464	324
Marrowstone Point 18464	323
Marshfield Channel 18587	243
Martin Island 18524	260
Martin Slough 18524	262
Martinez 18657	209
Maryhill 18533	272
Marys Peak 18580	246
Marysville	219
Marysville 18443	346
Massacre Bay 18425	307
Mathews Point 18526	268
Matia Island 18421, 18431	312
Mats Mats Bay 18461	325
Mattole Canyon 18623	227
Mattole Point 18623	227
Mattole River 18623	227
Maui Island 19340	387
Maulua Bay 19320	376
Mauna Kea 19320	374
Mauna Loa 19320	374
Mauna Loa 19340	397
Maunalei Gulch 19347	396
Maunalua Bay 19358	401
Maury Island 18448	358
Mayfield Slough 18651	192
Maylor Point 18428	348
Mayne Island 18421	320
Mayo Cove 18448	366
McConnell Island 18425	306
McCurdy Point 18467	297
McGregor Point Light 19347	390
McKenzie Head 18521	254
McLean Point 18581	247
McNary Lock and Dam 18541	272
McNear Canal 18654	206
McNeil Island 18448	366
McNutt Gulch 18623	227
Meadow Point 18441	327
Meadowdale 18441	341
Measured Courses	438
Medical advice	13
Mendocino 18628	224
Mendocino Bay 18628	224
Mendocino Canyon 18623	227
Mercator projection	16
Mercer Island 18447	341
Midchannel Bank 18464	323
Middle Bank 18421	298
Middle Breakwater 18751	135
Middle Channel 18421	303
Middle Farallon 18645	177
Middle Harbor 18650	192
Middle Harbor 18751	135
Middle Loch 19357	406
Middle Point 18449	356
Middle Point 18658	210
Middle River 18661	214, 215
Middle Rock 18480	282
Middle Rock 18727	160
Middle Waterway 18453	362
Midway Islands 19480, 19481	429
Midway Point 18600	233
Mile Rocks 18649	179
Mill Ranch 18504	277
Miller Bay 18446	327
Miller Island 18533	272
Miller Peninsula 18467	297
Millers Peak 19016	419
Millicoma River 18580	243
Millington 18587	243
Milolii 19320	381
Milolii Point Light 19320	381
Milwaukee Waterway 18453	362
Milwaukie 18528	267
Minesweeper signals	22
Minor Island 18429, 18421	293
Miramontes Point 18682	172
Misery Point 18458	352
Mission Bay 18765	128
Mission Beach 18765	129
Mitchell Bay 18433	300
Moaula 19347	394
Moclips 18500	281
Moclips River 18500	280
Mokae Cove 19340	388
Mokapu Island 19347	400
Mokapu Peninsula 19357	410
Mokeehia Island 19342	391
Mokelumne River 18661, 18662	213
Mokio Point 19351	399
Mokohola Island 19347	400
Mokolea Point 19385	416
Mokolea Rock 19347	400
Mokolea Rock 19357	410

Page
Mokolii Island 19359 409
Moku o Loe Island (Coconut Island) 19359 409
Mokuaeae Island 19385 416
Mokualai 19357 408
Mokuauia 19357 408
Mokuhooniki 19347 397
Mokulua Islands 19357 410
Mokumana Rock 19340 393
Mokumanu Islands 19357 410
Molate Point 18649 202
Moloaa Bay 19381 416
Molokai Island 19340 397
Molokai Light 19351 399
Molokini 19347 389
Molokini Island Light 19347 389
Montara Mountain 18680 172
Monterey 18685 169
Monterey Bay 18685 169
Monterey Canyon 18685 169
Monterey Harbor 18685 169
Monterey Wind Gap 18685 170
Montesano 18502 279
Montlake Cut (Portage Cut) 18447 341
Moore Hill 18623 227
Mooring Rock 18628 224
Moresby Island 18421 301
Morgan Rock 18620 226
Morro Bay 18703 164
Morro Bay West Breakwater Light 18703 164
Morro Rock 18703 164
Morrow Cove 18655 207
Mosquito Pass 18433 300
Moss Landing 18685 170
Moss Landing Harbor 18685 170
Mouatt Reef 18432 301
Mount Adams 18007 253
Mount Buchon 18700 164
Mount Carmel 18680 168
Mount Constitution 18421 306
Mount Dallas 18433 298
Mount Hood 18007 253
Mount Saint Helens 18007 253
Mount Tamalpais 18649 178
Mount Vernon 18400 348
Mouse Rock 18703 165
Mud Bay 18448 369
Mugu Canyon 18720 147
Mukilteo 18443 345
Mukilteo Light 18443 345
Multnomah Channel 18524 262
Muolea Point 19340 388
Murden Cove 18446, 18449 327
Mussel Point 18600 232
Mussel Rock 18603 233, 234
Mussel Rock 18623 228
Mussel Rocks 18623 227
Mutiny Bay 18441 325
Mystery Bay 18464 325

Na Pali (Napali) 19381 415
Na Puu a Pele 19320 381
Naalehu 19320 380
Nahcotta 18504 277
Nahcotta Channel 18504 277
Nahiku 19340 394
Nahuna Point 19347 389
Nakalele Point 19347 391
Nanaimo 18400 321
Nanakuli 19357 407
Nanoose Harbor 18400 321
Nanualele Point 19341 388
Napa 18654 207
Napa River 18654 207
Napili Bay 19347 391
Napoopoo 19332 382
Narrow channels 24
Naselle 18504 277
Naselle River 18504 277
National City 18773 125
National Ocean Survey 4

Page
National Ocean Survey Offices 432
National Weather Service 7
National Weather Service Forecast Offices (WSFO's) 7, 437
National Weather Service Offices 7, 436
National Weather Service Port Meteorological Officers (PMO's) 8, 437
Nautical Almanac 433
Nautical Charts 4, 14, 432
Navarro Head 18626 223
Navarro River 18626 223
Navigation Regulations 93
Navigation Safety Regulations 81
Nawiliwili 19383 411
Nawiliwili Bay 19383 411
Nawiliwili Harbor Light 19383 411
Nawiliwili Small-Boat Harbor 19383 412
Neah Bay 18484 293
Neahkahnie Mountain 18520 251
Necanicum River 18520 252
Neck Point 18425 305
Necker Island 19016 422
Ned Point 18465 292
Neds Rock 18502 278
Needle Rock 18601 237
Needle Rock 18620 226
Needle Rock Point 18680 171
Nehalem 18556 251
Nehalem Beach 18556 251
Nehalem River 18556 251
Neill Point 18448 358
Nemah River Channel 18504 277
Nero Seamount 19480 430
Neskowin Rock 18520 249
Nestucca Bay 18520 249
Nestucca River 18520 249
Netarts 18520 249
Netarts Bay 18520 249
Neva Shoal 19442 428
New Dungeness Light 18465 296
New Westminster 18400 320
New York Point 18659 210
New York Slough 18661 211
Newberg 18528 268
Newport 18581 247
Newport 18754 131
Newport Bay 18754 131
Newport Beach 18754 131
Nihoa 19016 419
Niihau Island 19380 417
Ninini Point 19383 411
Ninole 19320 376
Ninole Gulch 19320 379
Nisqually Flats 18448 367
Nisqually Head 18448 367
Nisqually Reach 18448 367
Nisqually River 18448 367
NOAA Weather Radio 7, 436
Nob Island 18425 306
Nohili Dune 19381 415
Nohili Point 19381 415
Nominal range 17
Nonopapa Landing 19380 418
Nonou 19381 417
Noonday Rock 18645 177
Nordland 18464 325
North Arm 18400 320
North Bay 18421 303
North Bay 18502 280
North Beach Peninsula 18504 275
North Bend 18587 243
North Farallon 18645 177
North Fork 18400 348
North Head 18521 254
North Island 18773 125
North Island 19461 429
North Mokelumne River (North Fork) 18661 213
North Pass 18425 305
North Peapod 18430 312
North Portland Harbor 18526 268
North River 18504 277

	Page
North Rock 18480	282
North Rock 18601	237
North Slough 18587	243
Northampton Seamounts 19019	428
Northwest Anchorage 18728	159
Northwest Cape 19016	422
Northwest Harbor 18763	154
Northwest Island 18429, 18427	311
Northwest Pass 18429, 18427	311
Northwest Rock 18589	238
Northwest Rock 18601	237
Northwest Seal Rock 18603	234
Norwegian Point 18461	326
Nose Rock 18626	223
Notice to Mariners	433
Notices to Mariners	2
Novato Creek 18654	206
Noyo Anchorage 18626	224
Noyo Basin 18626	224
Noyo River 18626	224
Nuaailua Bay 19340	393
Nuu Anchorage 19340	389
Nuu Landing 19340	389
Nuuanu Pali 19357	400
O'Neal Island 18425	306
Oahu Island 19357	400
Oak Bay 18441	325
Oak Harbor 18428	348
Oak Head 18458	352
Oakland 18650	192
Oakland Bay 18457	370
Oakland Inner Harbor 18650	192
Oakland Outer Harbor 18650	192
Observatory Point 18465	294
Obstruction Island 18430	307
Obstruction Pass 18430	307
Obstructions	2
Ocean Beach 18740	128
Ocean Thermal Energy Conversion (OTEC) Site 19327	384
Oceano 18700	163
Oceanside 18774	130
Oceanside Harbor 18774	130
Ogden Point 18465	292
Oil Pollution	23
Oil well structures	115
Okala Island 19347	400
Okoe 19320	381
Okoe Bay 19320	381
Olalla 18448	359
Old River 18661	214
Olele Point 18461	325
Oleum 18654	206
Olga 18430	307
Olney	257
Olowalu 19347	390
Olowalu Stream 19347	390
Olympia 18456	368
Olympia Shoal 18456	369
Omega	20
Onamac Point 18441	347
Oneatta Point 18581	247
Ookala 19320	376
Oomano Point 19386	414
Oopuola Cove 19340	393
Opana Point 19340	393
Open Bay 18433	300
Opihikao 19320	379
Opikoula Point 19340	394
Orcas 18425	307
Orcas Island 18421	306
Orcas Knob 18432	306
Orchard Point 18449	354, 356
Orchard Rocks 18449	354
Oregon City 18528	267
Orella 18721	151
Orford Reef 18589	238
Oro Bay 18448	367
Ortega Hill 18725	150
Osborn Bank 18740	157
Ostrander 18524	262
Ostrich Bay 18449	356
Otter Rock 18561	248
Outer Islands 540	418
Outer Islet 18700	166
Outer Pinnacle Rock 19341	388
Outer Santa Barbara Passage 18762	154
Owen Point 18460	291
Oyster Bay 18448	370
Oyster Bay 18449	356
Oyster Point 18651	188
Oyster Point Channel 18651	188
Ozette Island 18485	284
Ozol 18657	209
Paa Cones 19381	413
Paauhau 19326	375
Paauilo 19320	376
Pachena Point 18460	285
Pacific Beach 18765	129
Pacific City 18520	249
Pacific Grove 18685	169
Padilla Bay 18427	314
Padre Junipero Serra's Cross 18725	149
Pahala 19320	379
Pahu Point 19347	400
Paia 19342	393
Pailolo Channel 19347	394
Painted Cave 18728	158
Paintersville 18662	217
Pakua 19320	379
Palaoa Point Light 19347	396
Palemano Point 19332	381
Pali Kaholo 19347	396
Pali o Kulani 19320	380
Pali o Mamalu 19320	380
Palisades 18757	155
Palix River 18504	277
Palm Beach 18685	170
Palmyra Atoll (Palmyra Island) 83157	431
Palos Verdes Point 18774	144
Pancake Point 18523	260
Pandora Hill 18465	293
Paniau 19380	417
Papa Bay 19320	381
Papaa Bay 19381	416
Papaaloa 19320	376
Papaikou 19320	376
Papalaua Falls 19347	400
Papawai Point 19347	390
Paradise Cay 18649	203
Paradise Cove 18744	146
Parker Reef 18421, 18431	306
Parks Bay 18425	305
Parry Bay 18465	292
Partridge Bank 18441	297
Pasco 18542	273
Pass Island 18427	308
Patos Island 18431	301
Paukaa Point Light 19324	376
Paukauila Stream 19357	408
Pauwalu Harbor 19347	397
Pauwalu Point 19340	393
Pauwela 19342	393
Pauwela Point 19342	393
Pauwela Point Light 19342	392
Peace Monument 18421	319
Peale Passage 18448	368
Peapod Rocks 18430	312
Pear Point 18421	303
Pearl and Hermes Reef 19461	429
Pearl Harbor 19357	406
Pearl Island 18433	300
Peavine Pass 18430	307
Pebble Beach 18686	168
Pecho Rock 18703	164
Pedder Bay 18465	292
Pelican Bay 18600	234
Pelican Bay 18729	158

Page
Pelly Point 18400 ... 320
Pend Oreille River 18554 ... 274
Pender Islands 18421 ... 301
Penguin Bank 19351 ... 399
Peninsula Point 18649 ... 202
Penn Cove 18441 ... 347
Penrose Point 18448 ... 366
Pepeekeo Point 19320 ... 376
Perez Cove 18765 ... 129
Perkins Reef 18480 ... 282
Pescadero Creek 18680 ... 172
Pescadero Point 18680 ... 172
Petaluma 18654 ... 206
Petaluma River 18654 ... 206
Pfeiffer Point 18686 ... 167
Phinney Bay 18449 ... 356
Pickering Passage 18448 ... 368
Picnic Island 18425 ... 307
Pico Blanco 18686 ... 167, 168
Pico Rock 18700 ... 165
Piedras Blancas 18700 ... 166
Pier 39 Marina 18650 ... 187
Pierce Island 18531 ... 270
Pierpont Bay 18725 ... 149
Pigeon Point 18680 ... 172
Pigeon Point Light 18680 ... 172
Pilale Bay 19340 ... 393
Pillar Point 18460 ... 294
Pillar Point 18682 ... 172
Pillar Point Harbor 18682 ... 172
Pillar Rock 18558 ... 250
Pilot Rock 18605 ... 231
Pilotage ... 122
Pimoe 19340 ... 389
Pin Rock 18759 ... 156
Piner Point 18448 ... 358
Pinnacle (Carmel) Point 18686 ... 168
Pinole Point 18654 ... 203
Pioneer Bank 19022 ... 428
Pipelaying barges ... 116
Pismo Beach 18700 ... 163
Pistol River 18602 ... 236
Pitas Point 18725 ... 149
Pitcher Point 18558 ... 250
Pitship Point 18467 ... 297
Pitt Island 18448 ... 366
Pitt Passage 18448 ... 366
Pittsburg 18659 ... 210
Plaskett Rock 18700 ... 166
Pleasant Harbor 18458 ... 352
Pleasure Point 18685 ... 171
Pogy Bank 19480 ... 430
Pohakueaea Point 19340 ... 389
Pohakuloa Point 19347 ... 396
Pohoiki 19320 ... 379
Pohue Bay 19320 ... 381
Point Adams 18521 ... 254
Point Ano Nuevo 18680 ... 171
Point Arena 18640 ... 223
Point Arguello 18721 ... 152
Point Atkinson 18400 ... 320
Point Avisadero 18651 ... 187
Point Bennett 18727 ... 160
Point Blunt 18649 ... 202
Point Bolin 18446 ... 354
Point Bonita 18649 ... 178
Point Brown 18502 ... 278
Point Buchon 18703 ... 164
Point Cabrillo 18628 ... 224
Point Carquinez 18657 ... 209
Point Castillo 18725 ... 150
Point Cavallo 18649 ... 202
Point Chehalis 18502 ... 278
Point Conception 18721 ... 151
Point Conception Light 18721 ... 151
Point Defiance 18453 ... 359
Point Defiance Park 18453 ... 359
Point Delgada 18620 ... 226
Point Diablo 18649 ... 179
Point Disney 18432 ... 301

Page
Point Doughty 18432 ... 306
Point Dume 18744 ... 146
Point Ellice 18521 ... 258
Point Estero 18703 ... 164
Point Evans 18448 ... 365
Point Fermin 18751 ... 134
Point Francis 18424 ... 315
Point George 18425 ... 305
Point Glover 18449 ... 355
Point Grenville 18500 ... 281
Point Grey 18400 ... 320
Point Hammond 18432 ... 301
Point Hannon 18461 ... 351
Point Herron 18452 ... 355
Point Heyer 18448 ... 358
Point Hudson 18464 ... 323
Point Hudson Harbor 18464 ... 324
Point Hueneme 18725 ... 147
Point Jefferson 18446 ... 327
Point Joe 18685 ... 169
Point Knox 18649 ... 202
Point La Jolla 18765 ... 129
Point Lobos 18649 ... 179
Point Lobos 18686 ... 168
Point Loma 18773 ... 125
Point Loma Light 18773 ... 125
Point Migley 18424, 18431 ... 312
Point Monroe 18446 ... 327
Point Montara 18680 ... 172
Point Mugu 18720 ... 147
Point No Point 18461 ... 326
Point of Arches 18485 ... 284
Point Partridge 18441 ... 297
Point Pedernales 18721 ... 162
Point Piedras Blancas 18700 ... 166
Point Pinos 18685 ... 169
Point Reyes 18647 ... 177
Point Reyes/Farallon Islands National Marine Sanctuary 18010 ... 177, 220
Point Roberts 18421 ... 319
Point Sal 18700 ... 163
Point San Bruno 18651 ... 188
Point San Luis 18704 ... 163
Point San Pablo 18649 ... 202
Point San Pedro 18649 ... 203
Point San Pedro 18680 ... 173
Point San Quentin 18649 ... 203
Point Santa Cruz 18685 ... 170
Point Sierra Nevada 18700 ... 166
Point Southworth 18448 ... 359
Point St. George 18603 ... 234
Point Stuart 18649 ... 202
Point Sur 18686 ... 167
Point Tiburon 18649 ... 202
Point Vancouver 18531 ... 270
Point Vashon 18449 ... 358
Point Vicente 18746 ... 144
Point Wells 18446 ... 327
Point White 18449 ... 355
Point Whitehorn 18421 ... 318
Point Wilson 18441 ... 297
Point Wilson 18464 ... 323
Point Zelatched 18458 ... 352
Pointer Island 18430 ... 311
Pokai Bay 19361 ... 407
Pole Pass 18425 ... 305
Polnell Point 18428 ... 348
Polynesian-English Geographic Glossary ... 371
Poo Point 19386 ... 414
Porlier Pass 18400 ... 320
Port Allen 19382 ... 413
Port Angeles 18468 ... 295
Port Angeles Boat Haven 18468 ... 296
Port Costa 18657 ... 207
Port Gamble 18461 ... 351
Port Gamble Bay 18461 ... 351
Port Gardner 18444 ... 345
Port Hueneme 18725 ... 147
Port Kelley 18542 ... 272
Port Ludlow 18461 ... 325, 326

Page

Port Madison 18446 ... 327
Port of Allyn 18448 ... 353
Port of Anacortes 18427 ... 313
Port of Bellingham 18424 ... 316
Port of Benicia 18657 ... 209
Port of Brookings 18602 ... 235
Port of Edmonds 18446 ... 327
Port of Ilwaco 18521 ... 257
Port of Long Beach 18751 ... 134
Port of Long Beach 18751 ... 141
Port of Los Angeles 18751 ... 134
Port of Oakland 18650 ... 192
Port of Portland 18526 ... 263
Port of Redwood City 18651 ... 188
Port of Sacramento 18662 ... 217
Port of San Francisco 18650 ... 183
Port of Seattle 18450 ... 331
Port of Tacoma 18453 ... 359
Port of Umatilla 18541 ... 272
Port of Walla Walla 18542 ... 273
Port Orchard 18446, 18449 ... 353
Port Orchard 18452 ... 355
Port Orford 18589 ... 238
Port Quendall 18447 ... 341
Port Renfrew 18460 ... 292
Port San Juan 18460 ... 291
Port San Luis 18704 ... 163
Port Series ... 433
Port Stanley 18429, 18421 ... 308
Port Susan 18441 ... 347
Port Townsend 18464 ... 323
Port Townsend Boat Haven 18464 ... 324
Port Townsend Canal 18464 ... 324
Port Washington Narrows 18449 ... 356
Port Westward 18523 ... 260
Portage 18448 ... 358
Portage Bay 18447 ... 341
Portage Head 18485 ... 284
Portage Inlet 18465 ... 292
Portland 18526 ... 263
Ports and Waterways Safety ... 69
Portugese Point 18521 ... 259
Possession Point 18441 ... 326
Possession Sound 18441 ... 341
Post Office Bar Range 18526 ... 263
Post Point 18424 ... 315
Potatopatch Shoal 18649 ... 178
Potlatch 18448 ... 353
Poulsbo 18446 ... 354
Poverty Bay 18448 ... 358
Pratt Cliff 18500 ... 281
Preparations for being towed by Coast Guard ... 13
President Channel 18421, 18432 ... 306
Presidio Military Reservation 18650 ... 183
Presidio Monument 18685 ... 169
Prevost 18432 ... 301
Prevost Harbor 18432 ... 301
Price Island 18523 ... 259
Priest Rapids Dam ... 274
Prince Island 18602 ... 234
Prince Island 18727 ... 160
Principal ports ... 122
Prisoner Rock 18605 ... 231
Prisoners Harbor 18729 ... 158
Prosper 18580 ... 240
Protection Island 18467 ... 297
Puako 19330, 19327 ... 384
Puako Bay 19330, 19327 ... 384
Public Health Service ... 6
Public Health Service Quarantine Stations ... 437
Publications and Charts–National Ocean Survey ... 432
Publications and Charts–Other U.S. Government Agencies ... 432
Pueo Point 19380 ... 418
Puffin Island 18421, 18431 ... 312
Puget Island 18523 ... 259
Puget Sound 18440 ... 322
Puget Sound Naval Shipyard 18452 ... 356
Puget Sound Vessel Traffic Service ... 73
Puget Sound Vessel Traffic Service 18400, 18440 ... 288

Page

Puhilele Point 19340 ... 388
Pukaulua Point 19340 ... 394
Pukoo 19353 ... 398
Pukoo Harbor 19353 ... 398
Pulemoku 19357 ... 408
Puna District 19320 ... 378
Punaluu 19322 ... 379
Punaluu 19357 ... 409
Punaluu Harbor 19322 ... 379
Punchbowl Hill 19364 ... 402
Punta Arena 18728 ... 158
Punta Gorda 18623 ... 227
Punta Gorda 18725 ... 149
Puolo Point 19382 ... 413
Purisima Point 18700 ... 162
Puu Anahulu 19320 ... 384
Puu Enuhe 19320 ... 379
Puu Hawaiiloa 19357 ... 410
Puu Honuaula 19320 ... 379
Puu Hoomaha 19320 ... 380
Puu Hou 19320 ... 380
Puu Kamalii 19330 ... 384
Puu Kanaloa 19347 ... 389
Puu Kapukapu 19320 ... 379
Puu Koae (Sugarloaf) 19342 ... 391
Puu Konahuanui 19357 ... 400
Puu Koranae 19381 ... 416
Puu Kukai 19340 ... 393
Puu Kukui 19340 ... 387
Puu Laina 19348 ... 391
Puu Mailiilii 19361 ... 407
Puu o Hulu 19357 ... 407
Puu o Kahaula 19340 ... 388
Puu o Keokeo 19320 ... 381
Puu o Kohola 19340 ... 393
Puu Ohau 19327 ... 382
Puu Olai 19342 ... 391
Puu Olai 19347 ... 389
Puu Paheehee 19361 ... 407
Puu Papai 19351 ... 398
Puu Poa Point 19385 ... 415
Puu Ulaula 19320 ... 379
Puu Ulaula 19347 ... 396
Puu Waawaa 19320 ... 384
Puuhonua Point 19332 ... 381
Puuiki 19340 ... 388
Puukoae Island 19347 ... 395
Puukohola Heiau 19330 ... 384
Puukole Point 19380 ... 417
Puunoa Point 19348 ... 390
Puupehe Rock 19347 ... 395
Puuwai 19380 ... 418
Puyallup River 18453 ... 362
Puyallup Waterway 18453 ... 362
Pylades Channel 18400 ... 321
Pyramid Cove 18764 ... 154
Pyramid Head 18764 ... 154
Pyramid Point 18602 ... 234
Pyramid Rock 18558 ... 250
Pyramid Rock 18589 ... 239
Pyramid Rock 19357 ... 410

Quarantine Cove 18465 ... 292
Quarry Point 18649 ... 202
Quartermaster Harbor 18448 ... 358
Queensway Bay 18751 ... 136
Queets River 18500 ... 281
Quilcene 18458 ... 352
Quilcene Bay 18458 ... 352
Quilcene Boat Haven 18458 ... 352
Quillayute Needle 18480 ... 282
Quillayute River 18480 ... 282
Quinault River 18500 ... 281
Quivira Basin 18765 ... 129

Raccoon Shoal 18649 ... 203
Raccoon Strait 18649 ... 203
Race Rocks 18465 ... 292
Races Cove 18461 ... 351
Racons ... 20

Page

Radar 24, 374
Radar reflectors on small craft 13
Radar transponder beacons (Racons) 20
Radio aids to navigation 2
Radio bearings 19
Radio distress procedures 9
Radio navigation warnings and weather 13
Radio Navigational Aids 433
Radio shore stations providing medical advice 438
Radio Weather Broadcasts 436
Radiobeacons 19
Raft Island 18448 366
Raft River 18500 281
Ragged Point 18700 166
Rainier 18524 262
Raita Bank 19019 425
Randall Point 18443 345
Ranges 2
Ravenswood Point 18651 188
Raymond 18504 276
Reach Island 18448 368
Reading Rock 18600 232
Red Bluff 18640 223
Red Mountain 18600 233
Red Rock 18649 196
Redfish Rocks 18589 238
Redondo 18448 358
Redondo Beach 18744 145
Redondo Canyon 18744 144
Redwood City 18651 188
Redwood Creek 18651 188
Reed Island 18531 270
Reeds Bay 19324 377
Reedsport 18584 244
Reef Island 18425 305
Reef Point 18430 311
Reefs 419
Refugio Beach 18721 151
Regulated Boating Areas 116
Reid Harbor 18432 300
Reid Rock 18425 305
Repairs 122
Reported information 2
Reports from ships 13
Requa 18600 233
Reservation Head 18429, 18427 311
Resort Point 18744 144
Restoration Point 18449 328
Restricted areas 5, 116
Reynolds Rock 18620 226
Ribbon Rock 18757 155
Rich Passage 18449 354, 355
Richardson 18421 303
Richardson Bay 18649 202
Richardson Rock 18727 160
Richland 274
Richmond Beach 18446 327
Richmond Harbor 18649 196
Ridgefield 18524 263
Rincon Mountain 18725 149
Rincon Point 18650 183
Rincon Point 18725 149
Rio Vista 18661 217
Roberts Bank 18400 320
Robinson Landing 19386 414
Robinson Point 18448 358
Robinson Reef 18640 222
Roche Harbor 18433 300
Rock Creek 18531 271
Rocky Bay 18425 306
Rocky Bay 18448 368
Rocky Peak 18601 238
Rocky Point 18441 347
Rocky Point 18449 356
Rocky Point 18521 259
Rocky Point 18600 232
Rocky Point 18649 178
Rocky Point 18721 151
Rocky Prairie 18602 236
Rodes Reef 18728 159

Page

Rodgers Break 18620 226
Rodgers Peak 18600 232
Rogue River 18601 237
Rogue River Reef 18601 237
Rosario Head 18427 311
Rosario Point 18430 307
Rosario Strait 18429, 18421 308
Rosedale 18448 366
Rosenfeld Rock 18431 303
Ross Mountain 18640 222
Rounded Islet 18480 282
Routes 121, 374
Royal Roads 18465 292
Rules of the Road 433
Russian Gulch 18628 224
Russian River 18640 222
Ruthton 18531 271
Ryan Point 18531 270

Sacramento 18662 217
Sacramento River 18662, 18664 215
Sacramento River Deep Water Ship Channel 18662 215
Saddle Hill 18500 278
Saddle Mountain 18003 252
Saddle Peak 18700 164
Safety Zones 68, 84
Sail River 18460 294
Sail Rock 18460 294
Sail Rock 18640 222
Sailing Directions (Foreign Countries) 433
Saint Helens 18524 262
Salamanca Point 18400 320
Salem 268
Sales agents 4
Sales Information 432
Salinas Valley 18685 169
Salmon Bank 18421 303
Salmon Bank 19022 429
Salmon Bay 18447 340
Salmon Cone 18700 166
Salmon Harbor 18584 244
Salmon Point 18628 223
Salmon River 18520 249
Salt Point 18640 222
Samish Bay 18424 315
Samish Island 18424 315
Samoa 18622 229
Samuel Island 18421 320
San Augustine 18721 151
San Clemente 18774 131
San Clemente Island 18762 153
San Diego 18773, 18772 125
San Diego Bay 18772 125
San Diego Unified Port District 127
San Francisco 18650 183
San Francisco Approach Lighted Horn Buoy SF 18649 178
San Francisco Bar 18649 178
San Francisco Bay 18640 174
San Francisco International Airport 18651 188
San Francisco Port Authority 184
San Francisco-Oakland Bay Bridge 18650 183
San Joaquin River 18661 211
San Joaquin River above Stockton 18661 213
San Juan Capistrano 18746 131
San Juan Channel 18421 303
San Juan Cove 18765 129
San Juan Creek 18746 131
San Juan Island 18421 298
San Juan Islands 18421 298
San Juan Point 18460 291
San Juan Rock 18746 131
San Leandro Bay 18650 192
San Luis Hill 18704 163
San Luis Obispo Bay 18704, 18703 163
San Luis Obispo Creek 18704 163
San Luis Obispo Light 18704 163
San Martin Rocks 18700 166
San Mateo 18651 188
San Mateo Creek 18774 130

	Page
San Mateo Point 18774	130
San Mateo-Hayward Bridge 18651	188
San Miguel Island 18727	159
San Miguel Passage 18727	159
San Nicolas Island 18755	156
San Onofre Mountain 18774	130
San Pablo Bay 18654	203
San Pedro 18751	134
San Pedro Bay 18751, 18749	133
San Pedro Breakwater 18751	134
San Pedro Channel 18740	156
San Pedro Hill 18649	203
San Pedro Hill 18746	134
San Pedro Point 1872[illegible]	158
San Pedro Rock 18645	177
San Rafael 18649	203
San Rafael Bay 18649	203
San Rafael Creek 18649	203
San Simeon 18700	166
San Simeon Bay 18700	166
San Simeon Point 18700	166
Sand Hill Bluff 18680	171
Sand Island 18521	256
Sand Island 19367	402
Sand Island 19461	429
Sand Island 19481	429
Sand Island 19483	430
Sand Lake 18520	249
Sand Point 18447	341
Sand Point 18725	149
Sandpoint 18554	274
Sandy Island 18524	260, 262
Sandy Point 18421, 18424, 18431	318
Sandy Point 18432	301
Sandy Point 18443	347
Sandy Point 18727	159
Sandy River 18531	270
Santa Ana	118, 137
Santa Ana River 18746	132
Santa Barbara 18725	150
Santa Barbara Channel 18720	161
Santa Barbara Cove 18765	129
Santa Barbara Island 18756	157
Santa Barbara Island Light 18756	157
Santa Barbara Islands 18022	153
Santa Barbara Light 18725	150
Santa Barbara Point 18725	150
Santa Catalina Island 18757	154
Santa Cruz 18685	171
Santa Cruz Channel 18728	158
Santa Cruz Harbor 18685	171
Santa Cruz Island 18729, 18728	158
Santa Margarita River 18774	130
Santa Monica 18744	146
Santa Monica Bay 18744	144
Santa Rosa Island 18728, 18727	158
Santa Rosa Reef 18703	164
Santa Ynez Mountains 18725	149
Santiago Peak 18740	131
Saratoga Passage 18441	347
Sares Head 18429, 18427	311
Satellite Island 18432	301
Saturna Island 18421	303
Saunders Reef 18640	222
Sausalito 18649	202
Sauvie Island 18524	262
Scappoose Bay 18524	262
Scarboro Hill 18521	257
Scatchet Head 18441	326
Scheduled broadcasts	435
Scholfield Creek 18584	244
Scorpion Anchorage 18729	158
Scottsburg 18580	244
Scripps Institution of Oceanography	129
Scroggs Rocks 18465	292
Sea Lion Rock 18480	284
Sea Lion Rock 18620	225
Sea Lion Rock 18623	227
Sea Lion Rocks 18686	168
Seabeck 18458	352

	Page
Seabeck Bay 18458	352
Seabird Rocks 18460	285
Seabright 18685	171
Seacliff Beach 18685	170
Seal Beach 18749	133
Seal Cove 18762	154
Seal Rock 18460	294
Seal Rocks 18427	313
Seal Rocks 18561	246
Seal Rocks 18649	179
Sealion Rock 18500	281
Search and Rescue	8
Searchlights	24
Sears Point 18655	207
Sears Rock 18649	179
Seaside 18520	252
Seattle 18450	331
Seiche	21
Sekiu 18460	294
Sekiu River 18460	294
Selby 18655	206
Selkirk Water 18465	292
Semiahmoo 18421	319
Semiahmoo Bay 18421	319
Semiahmoo Spit 18421	319
Semple Point 18655	207
Sentinel Island 18433, 18425	300
Sentinel Rock 18433, 18425	300
Sequalitchew Creek 18448	367
Sequim Bay 18467	297
Sequim Bay State Park 18467	297
Settler Point 18523	259
Seven Devils 18580	240
Shanks Landing 18528	267
Shannon Point 18427	313
Shark Bay 19016	422
Shark Island 19402	422
Shark Reef 18421	303
Sharp Point 18600	232
Shaw Island 18425	307
Shell Beach 18700	163
Shelter Cove 18620	226
Shelter Cove 18645	177
Shelter Island 18773	128
Shelter Island Yacht Basin 18773	128
Shelton 18457	370
Sheringham Point 18465	292
Sherman Island 18661	215
Sherwood Creek 18448	368
Shilshole Bay 18447	328
Shilshole Bay Marina 18447	328
Shine 18461	351
Ship Harbor 18427	313
Ship Rock 18759	156
Shirt Tail Reef 18425	306
Shoal Point 18465	292
Shoalwater Bay 18504	277
Shubrick Rock 18620	226
Sidney Island 18421	301
Sierra Point 18651	188
Signal Hill 18749	134
Siletz Bay 18520	248
Siletz River 18520	248
Siltcoos River 18580	244
Silverdale 18449	356
Similk Bay 18427	312
Simonton Cove 18727	160
Sinclair Inlet 18452	355
Sinclair Island 18421	312
Sister Rocks 18600	233
Sisters 18461	351
Sisters Rocks 18601	238
Sitcum Waterway 18453	362
Siuslaw River 18583	244
Sixes River 18589	239
Sixtymile Bank 18022	153
Skagit Bay 18427	312
Skagit Bay 18427, 18441	348
Skagit Island 18427	312
Skamokawa 18523	259

Page
Skiff Point 18449 ... 327
Skipanon River 18521 ... 257
Skipanon Waterway 18521 ... 257
Skipjack Island 18431 ... 301
Skokomish River 18448 ... 353
Skunk Point 18728 ... 159
Slate Rock 18700 ... 167
Slip Point 18460 ... 294
Small White Rock 18620 ... 226
Small-craft facilities ... 122
Smith Island 18429, 18421 ... 293
Smith Island 18704 ... 163
Smith Point 18521 ... 257
Smith River 18584 ... 244
Smith River 18600 ... 234
Smuggler Cove 18520 ... 251
Smuggler Cove 19347 ... 395
Smugglers Cove 18729 ... 158
Snake River 18545 ... 273
Snake Rock 18461 ... 326
Snatelum Point 18441 ... 347
Snee-oosh (Hunot) Point 18427 ... 313
Snodgrass Slough 18662 ... 217
Snohomish River 18444 ... 346
Snug Harbor 18433 ... 300
Soberanes Point 18686 ... 168
Soldiers Harbor 18626 ... 225
Soledad Mountain 18765 ... 129
Sonora Reef 18500 ... 281
Soquel Cove 18685 ... 170
Soquel Creek 18685 ... 170
Soquel Point 18685 ... 170
South Bay 18448 ... 367
South Bay 18502 ... 279
South Bay 18622 ... 229
South Bay 18649 ... 179
South Bellingham 18424 ... 316
South Bend 18504 ... 276
South Channel 18521 ... 259
South Channel 18649 ... 179
South Cove 18580 ... 240
South Fork 18441, 18400 ... 348
South Fork 18580 ... 243
South Laguna 18746 ... 131
South Mokelumne River (South Fork) 18661 ... 213
South Pass 18441 ... 347
South Pender Island 18432 ... 303
South Point 18728, 18727 ... 159
South Reef 18561 ... 246
South Rock 18480 ... 282
South Slough 18587 ... 242
South Vallejo 18655 ... 206
Southampton Shoal Light 18649 ... 196
Southeast Anchorage 18728 ... 159
Southeast Black Rock 18589 ... 238
Southeast Farallon 18645 ... 177
Southeast Island 19461 ... 429
Southeast Loch 19357 ... 406
Southeast Reef 18682 ... 172
Southwest Seal Rock 18603 ... 234
Souza Rock 18704 ... 163
Sow and Pigs 18558 ... 250
Spanish Bank 18400 ... 320
Spanish Canyon 18620 ... 226
Spartan Reef 19342 ... 392
Special Anchorage Areas ... 29
Special Notice to Mariners ... 433
Special signals ... 21
Spieden Bluff 18433, 18425 ... 300
Spieden Channel 18433, 18425 ... 300
Spieden Island 18433, 18425 ... 300
Spike Rock 18485 ... 284
Split Rock 18500 ... 281
Split Rock 18600 ... 232
Spoil areas ... 16
Spouting Horn 19381 ... 413
Spring Passage 18425 ... 306
Squalicum Boat Harbor 18424 ... 317
Squalicum Creek Waterway 18424 ... 316
Squamish 18446 ... 327

Page
Squamish Harbor 18461 ... 351
Squamish winds ... 318
Square Black Rock 18700 ... 167
Squaxin Island 18448 ... 369
Squaxin Passage 18448 ... 369
St. George Channel 18603 ... 234
St. George Reef 18603 ... 234
St. Paul Waterway 18453 ... 362
St. Rogatien Bank 19019 ... 425
Staines Point 18465 ... 293
Standard time ... 123
Stanley Channel 18504 ... 277
Stanley Peninsula 18504 ... 277
Stanley Rock 18531 ... 271
Stanwood 18441 ... 347
Star Rock 18603 ... 234
Starr Rock 18424 ... 315
Steamboat Island 18448 ... 369
Steamboat Rock 18623 ... 227
Steamboat Slough 18443 ... 346
Steamboat Slough 18523 ... 259
Steamboat Slough 18661, 18662 ... 215
Stearns Wharf 18725 ... 150
Steep Point 18425 ... 305
Steilacoom 18448 ... 367
Stella 18524 ... 260
Stevenson 18531 ... 271
Steveston 18400 ... 320
Stewarts Point 18640 ... 222
Still Harbor 18448 ... 366
Stillaguamish River 18441 ... 347
Stillwater Cove 18686 ... 168
Stillwell Point 18628 ... 224
Stockton 18661 ... 211
Stone Lagoon 18600 ... 232
Stonewall Bank 18561 ... 246
Storm surge ... 21
Storm warning display ... 118
Strait of Georgia 18400 ... 317, 319
Strait of Georgia 18421 ... 320
Strait of Juan de Fuca 18400 ... 287
Strait of Juan de Fuca Traffic Separation Scheme 18400 ... 287
Strawberry Bay 18430 ... 312
Strawberry Bay 18480 ... 282
Strawberry Island 18427 ... 311
Strawberry Island 18430 ... 312
Strawberry Point 18441 ... 348
Stretch Island 18448 ... 368
Striped Peak 18465 ... 294
Stuart Island 18432 ... 300
Sturgeon Bank 18400 ... 320
Submarine cables and pipelines ... 15
Submarine emergency identification signals ... 22
Sucia Island 18431 ... 301
Sucia Islands 18431 ... 301
Sugar Loaf 18623 ... 227
Suisun Bay 18656 ... 209
Suisun City 18656 ... 210
Suisun Point 18657 ... 209
Suisun Slough 18656 ... 209
Sulphur Springs Landing ... 244
Summerland 18725 ... 150
Summit Hill 19016 ... 422
Sunken Reef 18640 ... 222
Sunset Beach 18746 ... 132
Super Tanker Channel 18751 ... 135
Supplies ... 122
Sur Rock 18686 ... 167
Surf 18721 ... 162
Surface ship procedures for assisting aircraft in distress ... 11
Surface ship procedures for assisting distressed surface vessels ... 10
Sutil Island 18756 ... 157
Svensen 18523 ... 259
Swains Island 83484 ... 431
Swanson Channel 18421 ... 301
Swifts Bay 18430 ... 308
Swiftsure Bank 18460 ... 285

BEST DOCUMENT AVAILABLE

Page
Swinomish Channel 18427 313
Switzer Rock 18620 225
Sycamore Canyon 18686 167
Sylopash Point 18458 352

Table Bluff 18622 228
Table Mountain 18022 124
Table Mountain 18580 246
Tacoma 18453 359
Tacoma Narrows Bridge 18448 365
Taft 18520 248
Tahkenitch Creek 18580 244
Tahlequah 18448 359
Taholah 18500 281
Tahuya 18448 353
Tala Point 18461 326
Talcott Shoal 18727 159
Tanager Peak 19016 419
Tanglewood Island 18448 366
Tanner Bank 18740 153
Tantalus 19357 400
Tatoosh Island 18485 285
Teahwhit Head 18480 282
Ten Mile River 18620 225
Ten Mile River Beach 18640 223
Tenmile Creek 18580 .... 243, 245
Terminal Island 18751 133
Termination Point 18461 351
Tern Island 19402 422
Terrill Beach 18431 306
Thatcher Pass 18430 307
The Brothers 18623 227
The Brothers 18649 202
The Carillon 18759 155
The Dalles 18531 271
The Dalles Lock and Dam 18533 271
The Great Bend 18448 353
The Heads 18589 238
The Narrows 18448 365
The Twins 18461 326
Thomas Creek 18602 236
Thompson Cove 18448 367
Thorndyke Bay 18458, 18441 352
Thrasher Rock 18400 321
Three Arch Rocks 18558 250
Three Peaks 18620 226
Three Tree Point 18523 259
Three Tree Point (Point Pully) 18448 358
Threemile Creek 18580 244
Threemile Slough 18661 213
Tichenor Rock 18589 238
Tidal Canal 18650 192
Tidal Current Charts 4, 432
Tidal Current Diagrams 4, 432
Tidal Current Tables 4, 432
Tide Point 18421 311
Tide Rock 18700 167
Tide Tables 4, 432
Tillamook 18558 250
Tillamook Bay 18558 250
Tillamook Head 18520 252
Tillamook River 18558 250
Tillamook Rock 18520 252
Time 2
Time Signals 14
Toandos Peninsula 18458 352
Toke Point 18504 277
Tokeland 18504 277
Toleak Point 18480 282
Toledo 18581 247
Toliva Shoal 18448 366
Tolo 18446, 18449 353
Tolo Bank 18620 226
Tomahawk Island 18526 268
Tomales Bay 18643 221
Tomales Point 18643 220
Tongue Point 18465 294
Tongue Point 18521 259
Totten Inlet 18448 370
Towage 122

Page
Towhead Island 18430 312
Tracyton 18449 356
Traffic Separation Scheme (Gulf of Santa Catalina) 133
Traffic Separation Scheme (Los Angeles/Long Beach) 133
Traffic Separation Scheme (San Francisco) 174
Traffic Separation Scheme (Strait of Juan de Fuca) 287
Traffic Separation Schemes (Traffic Lanes) 22, 115
Tramp Harbor 18448 358
Tranquillon Mountain 18721 151
Treasure Island 18446 327
Treasure Island 18448 368
Treasure Island 18650 183
Trial Islands 18465 293
Trincomali Channel 18400 321
Trinidad 18605 231
Trinidad Harbor 18605 231
Trinidad Head 18605 231
Triton Cove 18441 353
Triton Head 18441 352
Tropic tides 117
Tropical cyclones 373
Troutdale 18531 270
Tskawahyah Island 18485 284
Tskutsko Point 18458 352
Tsunamis (seismic sea waves) 21, 118, 372, 403
Tsusiat Lake 18460 285
Tualatin River 18528 267
Tulalip 18443 347
Tulalip Bay 18443 347
Tule 210
Tunnel Island 18500 281
Tunnel Point 18531 270
Turn Island 18425 303
Turn Point 18432 300
Turn Rock 18425 303
Turner Cut 18661 215
Turtle Rocks 18600 232
Turtleback Mountain (Turtle Back Range) 18432 306
Twanoh State Park 18448 353
Twin Lakes 18685 171
Twin Peak 18700 167
Twin Rivers 18460 294
Twin Rocks 18421 303
Twin Rocks 18520 251
Twin Rocks 19341 388
Twin Spits 18461 351
Two Arches 18520 249
Two Harbors 18759 156
Tyee Shoal 18449 328
Tyler Bight 18727 160

U.S. Fishery Conservation Zone 25
U.S. Flag Merchant Vessel Locator Filing System (USMER) 24
U.S. Nautical Chart Numbering System 15
Uaoa Bay 19340 393
Ule Point 19347 394
Ulupau Crater 19357 410
Umatilla Reef 18485 284
Umilehi Point 19347 400
Umpqua River 18584 243
Umpqua River Light 18584 243
Under-keel clearances 1
Underwood 18531 271
Uniform State Waterway Marking System 20
Union 18448 353
Union Bay 18447 341
Upolu Point 19327 375
Upright Channel 18425 306
Upright Head 18430 308
Urban 18424 312
Urgent and safety broadcasts 435
Usal Rock 18620 225
Usal Valley 18620 226
Useless Bay 18441 326
Utsalady 18441 348
Utsalady Point 18441 348

Page
Valdes Island 18400 320
Vallejo 18655 206
Vancouver 18526 269
Vancouver Harbor 18400 320
Vancouver Lake 18524 263
Vashon 18448 358
Vashon Heights Landing 18448 358
Vashon Island 18448, 18449 358
Vaughn 18448 368
Vaughn Bay 18448 368
Vendovi Island 18424 315
Venice Cut 18661 211
Ventura 18725 149
Ventura Keys 18725 149
Ventura Marina 18725 149
Ventura River 18725 148
Ventura Rocks 18686 168
Verona 18664 219
Vessel Arrival Inspections 122
Vessel Bridge-to-Bridge Radiotelephone Regulations 26
Vessel Traffic Management 71, 114
Vessel Traffic Service (Puget Sound) 18400, 18440 .... 288, 322
Vessel Traffic Service (San Francisco) 115, 175
Vessel Traffic Services 73
Vessel Traffic Services (VTS) 115
Victoria Harbor 18465 292
Vigias 419
Villa Creek 18700 166
Village Point 18424, 18431 312
Viti Rocks 18424 315
Von Geldern Cove 18448 366
Von Helm Rock 18700 165

Waadah Island 18484 293
Waatch Point 18485 284
Waatch River 18485 284
Waddell Creek 18680 171
Wahiawa Bay 19382 413
Waiahukini 19320 380
Waialeale 19381 411
Waialee 19357 408
Waialua 19347 397
Waialua 19357 408
Waialua Bay 19357 408
Waianae 19361 407
Waianae Boat Harbor 19361 407
Waianae Mountains 19357 400
Waieli 19351 399
Waihee Point 19342 391
Waihee Reef 19342 .... 391, 392
Waihee Valley 19342 391
Waikahalulu Bay 19347 394
Waikapuna Bay 19320 380
Waikiki Beach 19364 401
Wailea 19320 376
Wailea Point 19358 410
Wailoa River 19324 377
Wailua 19340 393
Wailua 19381 416
Wailua Cove 19340 388
Wailua River 19381 416
Wailuku 19342 391
Wailuku River 19324 377
Wailupe 19358 401
Waima Point 19330 384
Waimanalo 19358 410
Waimanalo Bay 19358 410
Waimanu Valley 19320 375
Waimea 19386 414
Waimea Bay 19357 408
Waimea Bay 19386 414
Waimea River 19357 408
Waimea River 19386 414
Wainiha Bay 19385 415
Wainiha River 19385 415
Waioli Stream 19385 415
Waipa Stream 19385 415
Waipio 19320 375
Waipio Bay 19340 393
Waipio Valley 19320 375

Page
Waipouli 19381 417
Wake Island 81664 431
Walan Point 18464 324
Waldport 18561 246
Waldron 18432 301
Waldron Island 18432 301
Walker Island 18524 260
Walla Walla River 18542 273
Wallace Slough 18523 260
Wallula Junction 18542 273
Walnut Eddy 18528 267
Walnut Grove 18662 217
Wananapaoa Islet 19357 408
Warrendale 18531 270
Warrenton 18521 257
Warrior Point 18524 263
Warrior Rock 18524 263
Wasp Islands 18425 305
Wasp Passage 18425 306
Watch (station) buoys 19
Waterman Point 18449 355
Watmough Bay 18429, 18421 308
Wauna 18448 366
Wauna 18523 260
Weather 118
Wedderburn 18601 237
Weiser Point 18581 247
Weli Point 19382 413
Welles Harbor 19481 429
West Bank 18431 301
West Cove 18763 154
West Cove 19016 422
West End 18757 155
West Linn 18528 267
West Loch 19357 406
West Pass 18441 347
West Point 18427 308
West Point 18447 328
West Point 18728 158
West Sound 18425 307
West Waterway 18450 331
Westcott Bay 18433 300
Westcott Shoal 18727 160
Westdahl Rock 18704 163
Westhaven Cove 18502 279
Westpoint Slough 18651 188
Westport 18502 279
Westport 18523 260
Westport Slough 18523 260
Whale Rock 18603 234
Whale Rocks 18421 303
Whaleboat Rock 18700 166
Whalehead Island 18602 236
Whaler Island 18603 234
Whaler Island 18704 163
Whalers (Carmel) Cove 18686 168
Whalers Knoll 18686 168
Whatcom Creek Waterway 18424 316
Wheeler 18556 251
Whidbey Island 18429, 18421 293
Whistling 24
White Cove 18757 155
White Point 18703 165
White Rock 18432 306
White Rock 18480 284
White Rock 18600 .... 232, 233
White Rock 18700 165
White Rock No. 1 18700 166
White Rock No. 2 18700 166
White Salmon River 18531 271
Whites Landing 18757 155
Whites Point 18746 144
Whitesboro Cove 18628 223
Whiting Rock 18649 202
Whitney Point 18458 352
Wildcat Cove 18424 315
Willamette 18528 267
Willamette Falls Canal 18528 267
Willamette River 18526 263
Willapa Bar 18504 275

Page
Willapa Bay 18504 275
Willapa Bay Light 18504 275
Willapa River 18504 276
William Head 18465 292
William Point 18424 315
Williamson Rocks 18429, 18427 311
Willoughby Rock 18500 281
Willow Creek 18700 166
Willows Anchorage 18728 158
Wilmington 18751 134
Wilson Cove 16763 154
Wilson Creek 18600 233
Wilson Rock 18600 233
Wilson Rock 18727 160
Wilsonville 18528 268
Winchester Bay 18584 244
Wind River 18531 271
Winds 2
Windward Oahu 19357 408
Windy Bluff 18448 368
Wing Point 18449 327
Winslow 18449 328
Wire drags 21
Wishkah River 18502 280
Wollochet Bay 18448 366
Woodland 18524 262
Woods Lagoon 18685 171

Page
Worldwide Marine Weather Broadcasts 433
Wreck Creek 18500 281
Wyckoff Ledge 18727 160
Wyckoff Shoal 18448 366

Yachats River 18580 246
Yakima River 272
Yamhill River 268
Yankee Point 18686 168
Yankee Point Rock 18686 168
Yaquina 18581 247
Yaquina Bay 18581 246
Yaquina Head 18561 246
Yaquina Head Light 18561 246
Yaquina Reef 18561 246
Yaquina River 18581 246
Yellow Bluff 18649 202
Yellow Island 18425 306
Yellow Rock 18602 236
Yeomalt Point 18449 327
Yerba Buena Island 18650 183
Yokeko Point 18427 311
Youngs Bay 18521 257
Youngs River 18521 257
Yukon Harbor 18449 358

Zuniga Point 18773 125
Zuniga Shoal 18773 125

☆U.S. GOVERNMENT PRINTING OFFICE: 1982-360-997/2102

BEST DOCUMENT AVAILABLE

Form Approved. OMB No. 41-R2455

NOAA FORM 77-6
(10-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

COAST PILOT REPORT

PLEASE MAIL TO:

Director
National Ocean Survey
National Oceanic and Atmospheric Administration
ATTENTION: C324
Rockville, Maryland 20852

This record of your experience and observations when coasting, entering port, and/or following inside channels will be used to correct, amplify, or confirm the description now given in the Coast Pilot.

Please use additional sheets if more space is needed.

Additional report forms will be provided upon receipt of each report.

GEOGRAPHIC LOCATION

LATITUDE	LONGITUDE	CHART NUMBER	COAST PILOT NUMBER

VESSEL	MASTER/COMMANDING OFFICER
DATE OF OBSERVATION	OBSERVER

I. LANDMARKS: Mention those visible from seaward and useful for navigation (day and/or night); include natural ranges and indicate the pair of marks forming a range. Photographs of landmarks difficult to describe are solicited; each view should be labeled with the distance off and the direction towards which the camera was pointed.

TYPE	CHARTED		LATITUDE (*Approximate*)	LONGITUDE	DESCRIPTIVE INFORMATION HELPFUL IN IDENTIFICATION
	YES	NO			

II. RADAR: List best radar targets and, if known, give maximum useful radar range at which the object can be positively identified and used. Mention under remarks places you have observed radar returns to be misleading.

NAME OR TYPE OF FEATURE (*Include approximate latitude and longitude if necessary to identify on chart*)	MAXIMUM USEFUL RANGE

III. ROUTES: Where entrance and inside routes are not marked by aids to navigation, show recommended directions for Coast Pilot (latitude and longitude of entrance point, and distances and true courses made good); include natural steering ranges if available.

USCOMM-DC 4694-P73

IV. DANGERS: Mention those of concern to the navigator where special caution should be indicated in the Coast Pilot.

V. CURRENTS: Indicate places you have experienced conditions of current where special caution should be mentioned in the Coast Pilot.

VI. ANCHORAGES: Mention best anchorage in the area and other secure anchorages having good holding ground.

LOCATION *(Include anchorage bearings and natural ranges if available)*

TYPE OF BOTTOM OBSERVED:

	EXCEL	GOOD	FAIR	POOR	COMMENT
HOLDING QUALITY					
PROTECTION OFFERED					
ACCESSIBILITY					

RECOMMENDED FOR VESSELS:

LENGTH	DRAFT
____ TO ____ FT.	____ TO ____ FT.

VII. REMARKS:

VIII. OTHER COAST PILOT CHANGES

U.S. COAST PILOT

NUMBER	EDITION	PAGE	LINE(S)

NOTE: Any chart(s) submitted with your report to show conditions will be replaced free of charge.

READ: STRIKE OUT: INSERT AFTER: *(Circle one)*

NOAA FORM 77-6 (10-72)

USCOMM-DC 4694-P73

BEST DOCUMENT AVAILABLE

Form Approved. OMB No. 41-R2455

NOAA FORM 77-6
(10-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

COAST PILOT REPORT

PLEASE MAIL TO:

Director
National Ocean Survey
National Oceanic and Atmospheric Administration
ATTENTION: C324
Rockville, Maryland 20852

This record of your experience and observations when coasting, entering port, and/or following inside channels will be used to correct, amplify, or confirm the description now given in the Coast Pilot.

Please use additional sheets if more space is needed.

Additional report forms will be provided upon receipt of each report.

GEOGRAPHIC LOCATION			
LATITUDE	LONGITUDE	CHART NUMBER	COAST PILOT NUMBER
VESSEL		MASTER/COMMANDING OFFICER	
DATE OF OBSERVATION		OBSERVER	

I. LANDMARKS: Mention those visible from seaward and useful for navigation (day and/or night); include natural ranges and indicate the pair of marks forming a range. Photographs of landmarks difficult to describe are solicited; each view should be labeled with the distance off and the direction towards which the camera was pointed.

TYPE	CHARTED		LATITUDE *(Approximate)*	LONGITUDE	DESCRIPTIVE INFORMATION HELPFUL IN IDENTIFICATION
	YES	NO			

II. RADAR: List best radar targets and, if known, give maximum useful radar range at which the object can be positively identified and used. Mention under remarks places you have observed radar returns to be misleading.

NAME OR TYPE OF FEATURE *(Include approximate latitude and longitude if necessary to identify on chart)*	MAXIMUM USEFUL RANGE

III. ROUTES: Where entrance and inside routes are not marked by aids to navigation, show recommended directions for Coast Pilot (latitude and longitude of entrance point, and distances and true courses made good); include natural steering ranges if available.

USCOMM-DC 4694-P73

BEST DOCUMENT AVAILABLE

IV. DANGERS: Mention those of concern to the navigator where special caution should be indicated in the Coast Pilot.

V. CURRENTS: Indicate places you have experienced conditions of current where special caution should be mentioned in the Coast Pilot.

VI. ANCHORAGES: Mention best anchorage in the area and other secure anchorages having good holding ground.

LOCATION *(Include anchorage bearings and natural ranges if available)*

TYPE OF BOTTOM OBSERVED:

	EXCEL	GOOD	FAIR	POOR	COMMENT
HOLDING QUALITY					
PROTECTION OFFERED					
ACCESSIBILITY					

RECOMMENDED FOR VESSELS:

LENGTH	DRAFT
____ TO ____ FT.	____ TO ____ FT.

VII. REMARKS:

VIII. OTHER COAST PILOT CHANGES

U.S. COAST PILOT

NUMBER	EDITION	PAGE	LINE(S)

NOTE: Any chart(s) submitted with your report to show conditions will be replaced free of charge.

READ: STRIKE OUT: INSERT AFTER: *(Circle one)*

NOAA FORM 77-6 (10-72)

USCOMM-DC 4694-P73

494